DOCUMENT RESUME

ED 285 630 JC 870 403

AUTHOR Carter, Meredith L.
TITLE An Analysis of Skills and Knowledge Needed by Firms in the Indianapolis, Indiana MSA.
PUB DATE 87
NOTE 104p.; Thesis, Economic Development Institute, University of Oklahoma.
PUB TYPE Dissertations/Theses - Undetermined (040) -- Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Community Surveys; *Educational Needs; *Employer Attitudes; *Employment Projections; *Employment Qualifications; Entry Workers; *Job Skills; Needs Assessment; *Occupational Information; Questionnaires

ABSTRACT

A study was conducted to determine employers' perceptions of the technical and personal skills and knowledge needed by business and industry in the Indianapolis area. A survey instrument, requesting employers to rate the importance of 17 technical skills and 13 personal skills and to describe the nature of the work at their firms, was distributed to 500 firms. Study findings, based on a 30% response rate, included the following: (1) the five top ranked technical skills were good working habits, overall quality of work, communication skills, organizational skills, and problem-solving skills; (2) the five top ranked personal skills were attendance, attitude toward job, ability to follow instructions, punctuality, and ability to learn; (3) a high school education was indicated as the minimal level of acceptable education by 55% of the respondents; (4) 65.7% of the respondents felt that jobs in their field were becoming broader in scope; (5) 68.3% indicated that the number of skilled jobs would increase; and (6) approximately 35% indicated that the availability of educational opportunities was somewhat important to a company's decision to do business in a certain community. A literature review on economic trends and the skills and knowledge that will be needed by employees in the future, and the survey instrument are included in the study report. (EJV)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED285630

THE UNIVERSITY OF OKLAHOMA

ECONOMIC DEVELOPMENT INSTITUTE

AN ANALYSIS OF SKILLS AND KNOWLEDGE NEEDED BY FIRMS IN THE INDIANAPOLIS, INDIANA MSA

A Thesis

submitted in paritial fulfillment

of the requirements for a certificate

from the

Economic Development Institute

TC870403

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Dr. Meredith L. Carter

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

by

Dr. Meredith L. Carter

Indianapolis, Indiana

1987

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

ABSTRACT

AN ANALYSIS OF SKILLS AND KNOWLEDGE NEEDED BY FIRMS IN THE INDIANAPOLIS, INDIANA MSA

By Dr. Meredith L. Carter

The purpose of the study was to determine the skills and knowledge that will be needed by future employees of business and industry in the Indianapolis MSA. The study was desired to examine the technical skills, the personal skills and the nature of work required by the employer.

The basic design of the study can be classified as a field study, with data gathered exclusively through confidential questionnaires. The sample for the study was defined as 500 businesses and industries located in the Indianapolis MSA, and selected on a random basis by Standard Industrial Code (SIC). A survey instrument was developed for the study. The instrument consisted of one open-end question and items scaled from one to five.

Personnel from business and industry indicated that one of the most important items listed under the technical skills and knowledge heading was good work habits. The average response rate for good work habits was 4.7 for all categories of respondents. In addition to indicating that good work habits were important, 77.5 percent of the respondents recorded that the item was very important.

The study also revealed other technical skills and knowledge that business and industry personnel indicated to be important. THe other items in the top five of importance are overall quality of work 4.64, communication skills 4.37, organizational skills 4.21, and problem-solving skills 4.16.

The highest rated items in the survey was from the personnel skill category. The business and industry leaders rated attitude toward the job as a 4.83 on the five point scale. The data indicated 2.9 percent of the business and industry leaders perceived attitude toward the job as very important.

The other personnel skills items rated in the top five are attendance 4.77, ability to learn 4.64, punctuality 4.61, and the ability to follow instructions 4.60.

Reported perception indicated that a high school education was very important, followed by one to two years of college.

Also, in describing the nature of work, business and industry personnel indicated that the skills required to perform most jobs are becoming more broad (65.7 percent). The study was also designed to identify if jobs are becoming more complex or more simple. The average response was 4.1 that jobs are becoming more broad for all categories of respondents on a five point scale. Almost 81 percent reported that jobs are becoming more complex.

Attitudes of business and industry personnel toward the effect of postsecondary education opportunities as a primary reason for selecting a location to do business were moderately favorable. The average response was 3.1 for all categories of respondents on a five point scale.

AN ANALYSIS OF SKILLS AND KNOWLEDGE NEEDED BY FIRMS IN THE INDIANAPOLIS, INDIANA MSA

APPROVED:

_____ _____

_____ _____

_____ _____

Table of Contents

Page

LIST OF TABLES.....v

Chapter

I. Introduction.....1

Purpose of the Study
Significance of the Study
Limitations of the Study
Data Collection
Organization of the Study

II. Review of the Literature.....13

Conceptual Historical Trends in the Economy
Skills and Knowledge Needed by Tomorrow's Workers

III. Organization and Design of the Study.....38

Methodology and Procedure
Instrumentation
Validation Procedures
Data Collection Procedures
Data Analysis Procedures

IV. Analysis of Data.....44

Current Trends in Technical and Personal Skills
Perceived Importance of Technical Skills and Knowledge in Hiring Future Employees
Perceived Importance of Personal Skills in Hiring Future Employees
The Nature of Work Related in the Hiring of Future Employees

V. Summary, Conclusions and Recommendations.....81

Summary of Findings
Conclusions
Recommendations

Page

APPENDICES.....87

BIBLIOGRAPHY.....93

LIST OF TABLES

Table		Page
1.	Percentage Employment Change in Indianapolis Industry Between 1973-1978	17
2.	Sensitivity of Industries to Economic Business Cycles	18
3.	Various Measures of the Condition of the Economy	22
4.	Net Change in Employment and Establishments by Size and Types for Three Intervals, 1969 - 1976	23
5.	Direct Job Creation in U.S. Due to Robotics, by Occupation, 1990	28
6.	Response from all Business/Industry Personnel	45
7.	Top Five Ranking of Technical Skills Needed by Future Employees	45
8.	Top Five Ranking of Personal Skills Needed by Future Employees	46
9.	Frequencies and Average Response Scores Related to the Importance of Job-Related Technical Knowledge in Future Employees, by Industry Group	47
10.	Frequencies and Average Response Scores Related to the Importance of Good Work Habits in Future Employees, by Industry Group	48
11.	Frequencies and Average Response Scores Related to the Importance of Organizational Skills in Future Employees, by Industry Group	49
12.	Frequencies and Average Response Scores Related to the Importance of Communication Skills in Future Employees, by Industry Group	50
13.	Frequencies and Average Response Scores Related to the Importance of Mathematics Skills in Future Employees, by Industry Group	51
14.	Frequencies and Average Response Scores Related to the Importance of Computer Skills in Future Employees, by Industry Group	52

Table Page

15. Frequencies and Average Response Scores Related to the Importance of Problem Solving Skills in Future Employees, by Industry Groups....53

16. Frequencies and Average Response Scores Related to the Importance of Overall Quality of Work in Future Employees, by Industry Group....55

17. Frequencies and Average Response Scores Related to the Importance of Overall Quantity of Work Accomplished in Future Employees, by Industry Group....56

18. Frequencies and Average Response Scores Related to the Importance of Reading Ability in Future Employees. by Industry Group....57

19. Frequencies and Average Response Scores Related to the Importance of Reading Ability in Future Employees, by Industry Group....58

20. Frequencies and Average Response Scores Related to the Importance of Critical Thinking in Future Employees, by Industry Group....59

21. Frequencies and Average Response Scores Related to the Importance of Creativity in Future Employees, by Industry Group....60

22. Frequencies and Average Response Scores Related to the Importance of Decision Making with Incomplete Information in Future Employees, by Industry Group....61

23. Frequencies and Average Response Scores Related to the Importance of Knowledge Across Trade Lines in Future Employees, by Industry Group....62

24. Frequencies and Average Response Scores Related to the Importance of Attendance in Future Employees, by Industry Group....63

25. Frequencies and Average Response Scores Related to the Importance of Punctuality in Future Employees, by Industry Group....64

26. Frequencies and Average Response Scores Related to the Importance of Attitude Toward Job in Future Employees, by Industry Group....65

27. Frequencies and Average Response Scores Related to the Importance of Ability to Follow Instructions in Future Employees, by Industry Group....66

Table | Page

28. Frequencies and Average Response Scores Related to the Importance of Ability to Work without Supervision in Future Employees, by Industry Group.....67

29. Frequencies and Average Response Scores Related to the Importance of Cooperation with other Workers in Future Employees, by Industry Group.....68

30. Frequencies and Average Response Scores Related to the Importance of Cooperation with Management in Future Employees, by Industry Group.....69

31. Frequencies and Average Response Scores Related to the Importance of Personal Appearance in Future Employees, by Industry Group.....70

32. Frequencies and Average Response Scores Related to the Importance of Self-Discipline and Self-Reliance in Future Employees, by Industry Group.....71

33. Frequencies and Average Response Scores Related to the Importance of Tolerance for Ambiguity in Future Employees, by Industry Group.....72

34. Frequencies and Average Response Scores Related to the Importance of Ability to Learn in Future Employees, by Industry Group.....73

35. Minimum Level of Education Required for Most Technical Positions.....74

36. Degree that Skills Required to Perform Jobs are Becoming Narrow or Broad for Future Employees.....75

37. Degree that Jobs are Becoming More Complex or More Simple for Future Employees, by Industry Group.....76

38. The Percentage of Business and Industry Respondents Who Think the Number of Skilled Jobs Will Increase or Decrease.....77

39. Will the Decline in the Number of Young People Available for Work Affect the Business Environment.....78

40. Will Early Retirement of Employees Have an Important Affect on the Business Environment.....78

41. Frequencies and Average Response Scores Related to the Importance of Postsecondary Education Opportunities as a Primary Reason for Selecting a Location to Do Business, by Industry Group.....79

CHAPTER I

INTRODUCTION

Appropriate relations between a nation or state and the educational institutions are symbiotic ones. Ideally, a state and the educational institutions are mutually supportive of each other in the interest of a set of shared values through which they seek common purpose. Thus, as can be expected during times of perceived rapid change in the society at large, there is also heightened interest in examining the nature of education and training. As the United States moved from an economy based upon agriculture to an economy based upon industrial production over a hundred year period, the nature of education changed to conform to the new needs of the nation.

> Industrialization meant two changes in work preparation. Specific training was now required before specific tasks could be performed. In the traditional craft and agrarian order, people had "grown up" into stable, life-long occupations. The other change required a different orientation: Work activity was now focused away from the individual, family, or small group and toward a large, impersonal organization with a large, impersonal urban community. The Industrial Revolution required education for specific tasks and education to function within the emerging corporate organization.
> ... ...
> Industrial education was summoned as a strong argument for good free public schools. Educational philosophers, social reformers and workers' groups battling for their diverse goals agreed: The multiplying factories with their increasing technology needed workers with greater knowledge and skill, and workers with that education would be in a better position to deal with an increasingly oppressive factory system. Public education must, they urged, prepare citizens by teaching the elements of the mechanical arts and natural sciences needed to earn a productive

living in industry or agriculture, the two viable occupational options for the masses.[1]

The country is now moving very rapidly from a manufacturing society to a society based upon services and knowledge, an information society. Based on the trends, society should re-examine the nature of our educational enterprise. The evaluation is being done, and the result is an unusual number of national level reports and studies which focus on the strengths and weaknesses of American schools. The issues having major impact on educational policy at the national level have also affected the direction of educational policy in the states.

Choices must be made which anticipate society's needs in the future. In a relatively short time, American has changed from a nation in which 90 percent of the population produced food, to a period in which the majority of our population was involved in industrial production, to a period in which most citizens are involved with the services and professions collectively labelled the "information society."

The restructuring of America from an agrarian nation to a nation primarily engaged in industrial production occurred over an entire century. Changes in schooling to accommodate the changes in national character occurred over the same period. The changes occurred at a pace which provided ample opportunity for corrective actions in a society largely unaware of the changes effecting destiny. The once-dominant area of agriculture now accounts for only three percent of national

---

[1] Neil P. Eurich, Corporate Classrooms: The Learning Business (Princeton, New Jersey: The Carnegie Foundation, 1985), p. 26

employment, and in contrast, the shift from an industrial to a service and information economy occurred in only three decades. As recently as 1956, over half of the work force was first engaged outside of agricultural production and manufacturing. Today, only thirty years later, the estimated workforce projection is three of every four workers in America engaged in services and information, and only one in agriculture or manufacturing.[2]

In the earlier period of history, the educational system had the opportunity to adjust to a changed society; educational and social-economic mismatches could be tolerated with impunity given the rate of change in economic realities. Today, that may not be true. The student who enters a kindergarten this year or the first grade in 1987 is the student who will be the high school graduate of the year 2000. The graduates of the year 2000 will become the new engineers, teachers, plumbers, philosophers, and physicians of the first decade of the next century. The education for the year 2000 graduates has begun, but will the education be adequate for the next century? In arriving at the conclusions, a large array of data having to do with demographics, economics, predicted technologies, life styles, politics and values must be considered. From the data there are three sets of interrelated variables which appear to be the most relevant to the planning of the educational programs in the decades ahead:

---

[2]John Naisbitt, Megatrends: Ten Directions Transforming our Lives17 (New York: Warner Books, 1982), p. 14.

Demographics: "The United States is a nation of immigrants, an aging nation, and a nation on the move."

Economics: "The educational destiny and the economic destiny are inextricably bound together as the country moves from an economy based upon unskilled labor to an economy based upon literacy, upon knowledge, and upon human capital. As never before in history, decisions made about economic policy will be decisions made about educational policy, and decisions made about education will be decisions made about the economic welfare of citizens."

Educational Achievement: "Current educational achievements of students and residents take on meaning as one way of assessing the total impact of past educational and economic policies. The same assessments also provide a basis for establishing criteria for future improvements in the educational systems."[3]

Demographic trends are not recognized as destiny. Not only can the future be anticipated, but the future can also be structured somewhat to peoples liking. Certain parameters of the future, however, are more fixed than are others. The structure of the population is among such variables. The high school graduating classes of the years 2000, 2001,

---

[3]National Association of State Boards of Education, "Thinking Strategically about the Future," Education Week, November 14, 1984.

2002, and 2003 have been born; all of the graduating seniors of all classes through 1997 are now in school.

At the national level, large demographic shifts are occurring. The United States is an aging nation and a migrating nation that has geographically redistributed economic opportunity in such a way as to create a drain of both people (especially the best education people) and resources from the North and East to the South and West. In 1980, for the first time in our history, the South and West had more people (118 million) than did the North and East (108 million).

Finally, the nation is also experiencing significant redistribution of population. While outmigration will affect the population composition in many cities as a whole, redistribution of population within the states will affect the population profiles. In general, between 1980 and 2000 the following shifts are expected:

-Central metropolitan counties will change very little in population;

-Suburban counties will continue to grow rapidly, but not as rapidly as in the past;

-After a century of decline, some rural areas will experience slow growth, continuing the pattern developed in the '70's.

Some of the educational policy implications of the changing demographics are simple and obvious; others are complex and subtle. For the moment, the most obvious ramifications of the data are outlined below.

-Consistent with the decline in population growth rate will be a decrease in school enrollment into the next century. Nationally there is an "echo" of the baby boom which is being reflected in increased enrollment of K-4 students and which will result in enrollment increases in higher grades later.

-With decreased enrollments of traditionally school-aged children and an economy expected to be increasingly literacy-dependent, the opportunity may exist to expand educational opportunity and

increase educational achievement for older segments of the population.

-An "affordability" issue emerges when the demographic data of this section interacts with the data presented in the next section. In brief, an aging population must be supported by a disproportionately small and young work force.

The major goals of economic development and education are completely interdependent. The economic development depends very significantly upon the ability of the state to provide a productive and literate work force to meet the needs of existing and potential employers; funding an adequate system of education for individual citizens depends critically upon the state of the economy. The two share a common destiny. The people who are engaged in long-range educational planning should consider the major dimensions of the economy over the planning cycle. When viewed from the primary perspective of the individual, the same may be said of economic development. The education achieved must provide preparation for working and living throughout the nation and world as we know that world today and as people anticipate that they may exist over future decades.

In simplest terms, the future economy of any state will be judged in terms of its ability to deliver a mix of work and business opportunities which is consistent with the abilities, educational achievements, values, and economic aspirations of its citizens. Since these elements are diverse in nature, to be successfull the economy must be able to generate a diverse set of opportunities.

Purpose of the Study

The purpose of the study is to determine the skills and knowledge needed by business and industry in the Indianapolis, Indiana, areas as identified through surveys, interviews and research.

Specific questions which were to be answered through descriptive and evaluative research included the following:

1. What are the labor skills and knowledge needed in the area of technical skills, personal skills and nature of work skills?
2. What changes will occur in the labor skill requirements within the next few years?
3. What problems have business and industry had with lack of labor skills, training programs, and curricula at educational institutions?
4. What are the new skills needed by the worker of the future?
5. How important does business and industry feel education to be as a primary reason for selecting a location?
6. What skills are needed by various SIC groups?
7. What level of education is perceived to be the most important?

Significance of the Study

A report prepared by Central Research System[4] indicated a shift in the United States from a manufacturing base to an information base. While traditional manufacturing industries will not be abandoned, these industries will not continue to provide the majority of jobs in the Indianapolis area. Reports issued on traditional manufacturing industries bring the same message: Jobs have been lost and the jobs that will emerge will not be labor-intensive, but rather

---

[4]Central Research Systems, A Strategic Plan for the Industrial Development of Indianapolis: Economic Analysis and Strategies. Indianapolis, Indiana: Central Research Systems, May 1982).

technological-intensive through utilization of robotics in many assembly jobs previously held by workers. The realization has both positive and negative impacts. Workers who will not be returning to traditional manufacturing will need to be retrained for jobs that will provide economic independence. Another result will be that new manufacturing firms will emerge in the design and construction of robots and other technological advances that will require human workers.

While traditional manufacturing has been on the decline for the past 25 years, employment shares within manufacturing and the service-related sector have literally exchanged places. The Central Research report points out that in Indianapolis 71% of all new jobs during the 1970's were created by start-up firms with 20 or fewer employees. The start-up firms have included the development of new manufacturing areas, but the majority have been within the service sector. The new manufacturing base that has been emerging is one that compliments the thriving services and trade sectors with an emphasis on the application of technological advancements.

Educational institutions across the country have been under criticism and gained attention since the release of A Nation at Risk, a report by a national commission regarding the performance of the educational system in the United States.[5] The country stands on the edge of yet another evolution in the educational process. An evolution that will give emphasis to the cooperative and coordinated effort

---

[5]The National Commission on Excellence in Education, A Nation At Risk. (Washington, D.C.: The National Commission on Excellence in Education, Government Printing Office, 1983), p. 11.

between governing agencies, educational institutions, and the private sector in the development of a skilled and qualified workforce.

Technology has had and will continue to have a two-prong effect on the labor market. One effect has been the replacement of workers in traditional manufacturing industries and the placement of workers in emerging industries. Through economic development, The United States will see the establishment and expansion of firms which are competing in the arena of high technology; but "high tech" is not isolated to the manufacturing of a product. High technology also includes the application of a product. The application of high technology to the workplace will require that new job skills be learned by employees in order to retain current positions. High tech application will also require the investigation and analysis of jobs skills that will be required by future workers as new occupations emerge and change former occupations. Therefore, while high technology will have an adverse effect on the economy and the job market in the short-run, it will also have a positive effect in the long-term development of new industries and new jobs.

The role of education will be expected to change as this process occurs. There may be less emphasis placed on degree obtainment and a new emphasis on job-specific, educational/skill obtainment relevant to a targeted industry creating jobs. The individual will have to retool his or her thinking regarding education and not view education as an end process, but rather as a continuing process if the individual is to remain qualified and competent in an occupation or profession.

The role of business and industry will be significant in this process. If the needs of business and industry for a qualified work

force are paramount, they too will have to rethink the role they have played and become active partners in the education and training process. Business and industry will be expected to assert initiative and make a commitment to educational institutions in order to keep those institutions informed about where job requirements are changing and about the kinds of skills people will need to develop in order to perform jobs competently. Only through this cooperative effort will a worker be prepared for the future.

The second effect of high technology as it relates to employment is tied to the wages that industries pay to employees working in the manufacturing of products. Wage surveys and projections indicate that industries that are involved in the manufacturing of high technology products pay lower wages to employees than the traditional manufacturing industries. The effect has been discussed in conjunction with displaced worker programs and the obstacle that lower wages present to transferring individuals from traditional industries to future industries. Individuals defined as displaced workers present a cognitive dissonance to accepting these jobs which do not pay a wage that allows for a continuation of life-styles already obtained by wages earned in former jobs.

In addition, high technology industries are setting precedence for moving out of the country and taking jobs with them. A major reason for this has been the lower wages paid to workers in other countries. Judgements have been made on these issues that result in a major criticism of business "deserting" the United States for a bottom-line figure. While there are sympathizers on both sides of the issue, the effect has still been the same: a loss of jobs due to the placement of

high technology industries in other countries. We are even seeing individual States and Cities competing for high technology industries resulting in tax programs, economic development funding, creative financing, consulting services, etc. being offered companies willing to relocate to an economically depressed area. What the future will hold for individuals, states, cities, and governments as more control returns to states to support these programs is unknown.

This current study has relevance to the needs of educators today as they search for ways to support the productivity of business and industry and to recognize the new skills for which education and training will be needed.

Limitations of the Study

The study was subject to the following limitations:

1. The study used the questionnaire and interview technique to collect data.
2. The sample of the study was limited to the business and industries in the Indianapolis, Indiana area.
3. The study was somewhat limited by the reliance upon self-reported projections into the future.

Data Collection

Data for the study were collected through confidential questionnaires, confidential interviews, and supplemented by a review of the literature.

The questionnaire was reviewed by selected business personnel managers for validation. The personnel managers were asked to respond to all items and to suggest alteration to items which were considered to be ambiguous, difficult or otherwise inappropriate. Items were reworded

or eliminated as a result of information gathered from comments by pretest respondents.

Organization of the Study

The study was developed in five chapters, a selected bibliography and an appendix. Chapter I is the Introduction and states the purpose, significance, and limitations of the study, data collection, and the organization of the study.

Chapter II reviews the literature and research.

Chapter III describes the methods and procedures used to conduct the study.

Chapter IV is the report of the data and attendant analyses.

Chapter V presents a summary, conclusions, and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

The study was designed to analyze the skills and knowledge needed by business and industry in the Indianapolis, Indiana Metropolitan Statistical Area (MSA).

In order to first establish a historical and conceptual framework for examination of data for the study, Chapter II contains a review of selected literature related to trends in the economy and skills and knowledge needed by business and industry. This Chapter was divided into two major sections: (1) Conceptual historical trends in the economy, (2) Skills and knowledge needed by tomorrow's worker.

Conceptual Historical Trends in the Economy

The character of industry in the United States is changing. The nation is leaving behind the age of the Industrial Revolution and moving into the Information Age in which knowledge, rather than nuts and bolts, becomes the economy's driving force.

Within the last twenty-five years, manufacturing and service-oriented sectors literally exchanged employment percentages in the Indianapolis MSA. Trade employment also increased so that it now surpasses manufacturing as a percentage of the total labor force. Other sector growth remained relatively flat. This parallels national trends

and signifies the important thrust forward in America of the white-collar worker and the decline of the blue-collar laborer. In the last decade, United States manufacturers created only 5 percent of the net new jobs, while 89 percent were created in services and other non-good producing sectors such as trade and transportation. The shift is from jobs requiring high muscle content to those emphasizing high thought content.[6]

In most areas of the United States where manufacturing has been important, there is a compelling need to slow the decline of the manufacturing base--or, more precisely, to try to guide manufacturing on a course that is more appropriate to the future. The strategy is being attempted for several reasons:

(1) Manufacturing provides more jobs than any of the other sectors. Absolute manufacturing employment hasn't actually declined--it's just that the rapid percentage growth in services contrasts so sharply with the snail's pace growth in manufacturing.

(2) Manufacturing produced nearly double the amount of payroll dollars as did services in the period studied.

(3) Manufacturing has created most of our leading basic or export industries, often considered the prime generator of an economy.[7]

A common sense approach suggests that any economic development effort recognizes the importance of supporting "sunrise" industries (those with future potential) rather than "sunset" industries (those on their decline). An economic development plan would include revitalizing

---

[6]Central Research Systems, pp. 2-3.

[7]James Fallows, "America's Changing Economic Landscape," The Atlantic Monthly, (May, 1985), pp. 53-57.

ailing industries, where possible, with new products and processes. At the local level economic development activities would identify high growth industries and strategically measure them against international industrial trends to test for long-term viability and competitive advantages. Economic development would also analyze what employment shifts are occurring, to what extent the shifts represent transitions to better quality jobs, and how well the labor pool is equipped to accommodate development efforts. The area's greatest capital investment now may be in people.

Another way to show trends is to compare percentage of employment change by Standard Industrial Classification (SIC). The greatest growth clearly has been occurring in the non-goods producing sectors and lighter, even newer forms of manufacturing. Table 1 shows to what extent traditional major employers have lost ground in providing new jobs. Heavy manufacturing overall has lagged. With few exceptions in the post-1978 period, manufacturing has not undergone positive reversals experienced in varying degrees by other industries, e.g., nonprofits, air transport, printing, and chemicals. The trend, very likely, reflects the wedding of durable goods manufacturing to mature product lines and technologies suffering from foreign competition and lower productivity.[8]

Next to manufacturing, wholesaling is the most cyclically sensitive industry and a good part of the Indianapolis area's slower growth during this period appears to be a result of the area's extraordinary reliance

---

[8]Central Research Systems, pp. 7-8.

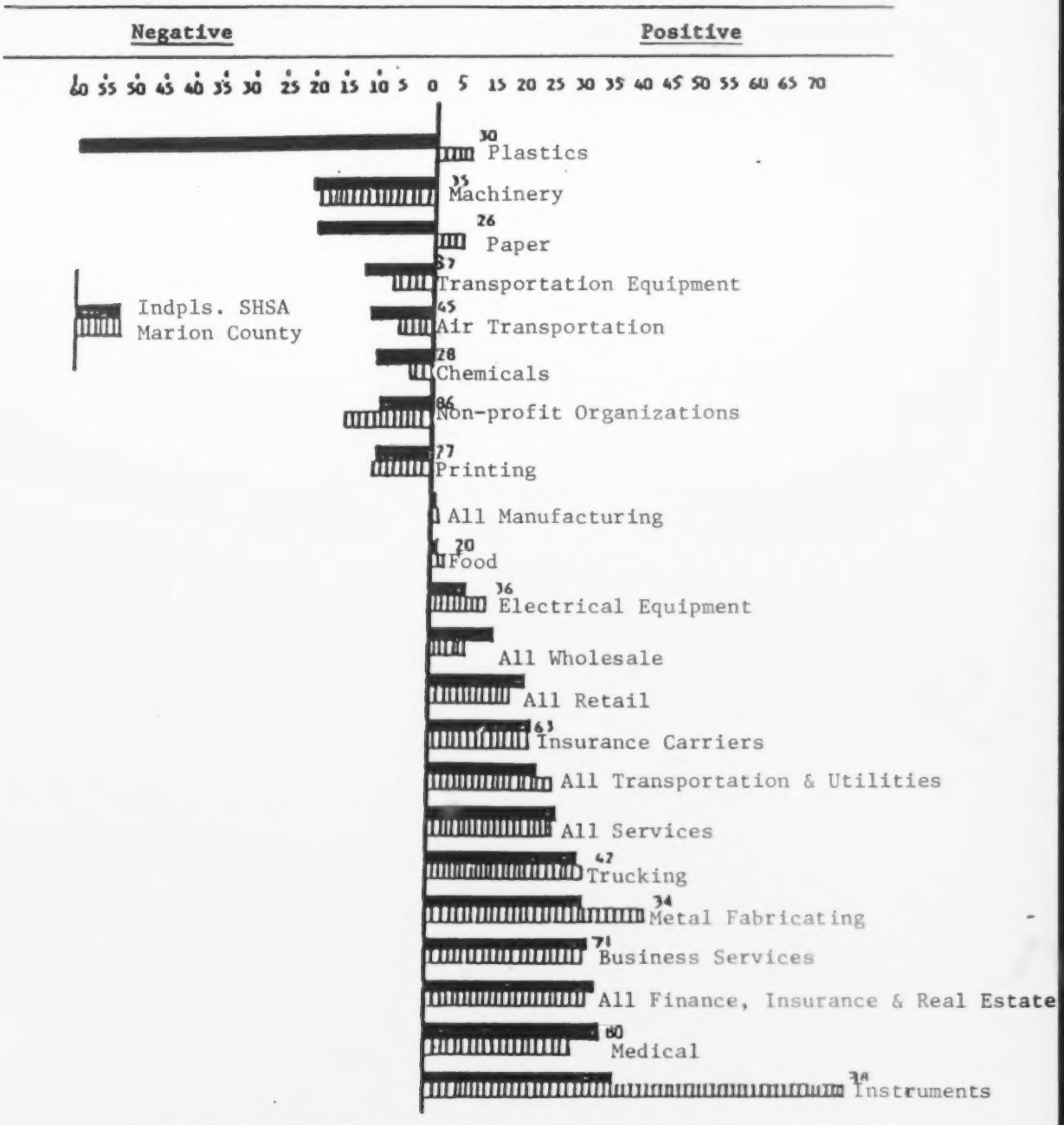
upon durable goods trade, especially within depressed industries such as machinery and automotive equipment. As of 1978, Marion County, Indiana had 20 times more employees in durable good trade than in nondurables with over half the workers engaged in the above two industries. The MSA showed a much broader mix of durables and nondurables, thus, its higher growth figures. (See Table 2.)

The current economic recovery provides an opportunity for leaders in business, government and labor to take the difficult steps required to resolve the state and midwest region's basic long-term problems nd spark a lasting revitalization of the economy. If leaders ignore these basic problems and do not act in a concerted way to address them, the result will be a continuation of the state's and region's decline. It is largely up to the states to choose their own future.

While the problems of recession and the restructuring of the economy under the impact of federal high interst rate policies cannot be ignored, it is clear that the principal midwestern region's problem is the loss of competitive position to domestic and foreign producers. This loss of position spans a wide range of industries, from steel to the fast-growing communications industry. Major losses have occurred both in industries dominated by a few large firms (such as automotive) and those composed of many small firms (such as machine tools). Each industry faces it own problems as well as those which affect the region as a whole. In order to become competitive again, the states must re-establish their leadership in productivity, marketing and use of technology.

TABLE 1

PERCENTAGE EMPLOYMENT CHANGE IN INDIANAPOLIS INDUSTRY, 1973 - 1978



Source: A Strategic Plan for the Industrial Development of Indianapolis: Economic Analysis and Strategies (Indianapolis, Indiana.: Central Research Systems, May 1982), p. 7a.

Since many of the nondurables employment opportunities are in lower wage and mature industries, shifting to the nondurable area is not the answer. The preferred strategy appears to be one of targeting growth areas. Since access to markets and suppliers is among companies most important locational decision factors, links between wholesalers and other industries should be emphasized in the targeting program. Numerous studies have been conducted that demonstrate how wholesalers follow manufacturers into a locality.[9]

TABLE 2

SENSITIVITY OF INDUSTRIES TO ECONOMIC BUSINESS CYCLES

Industry	Cyclically Sensitive Industry Rank
(1) Manufacturing	HIGH
(2) Wholesale Trade	
(3) Contract Construction	
(4) Transportation, Communication, Public Utilities	
(5) Retail Trade	
(6) Services	
(7) Mining	
(8) Finance, Insurance, and Real Estate	LOW

Source: The State of Small Business: A Report of the President (Washington, D.C.: U.S. Small Business Administration, March, 1982), p. 3.

Most economic researchers have either focused broadly upon aggregate measures of economic change flowing out of the GNP accounts or examined growth of individual firms on such a narrow basis that they

[9] Central Research Systems, p. 12.

missed the whole. Understanding has been fuzzy among economists and development specialists about the actual dynamics of company growth and the job generation process. As a result, policies and programs usually have focused upon larger, highly visible companies. The approach has been expensive and not always successful.

Research conducted by Dr. David Birth of MIT in recent years has produced some findings that cause rethinking about economic development priorities. Birch demonstrated a definite relationship between the size of a firm and its rate of growth. Birch determined that large firms are no longer the major providers of new jobs for Americans.[10]

Designing a special database, Birch was able to identify and compare not only the numbers of firms within different size categories for given periods of time, but also to track the firms as they moved into other size categories and locations over intervals of time. Data for each firm covered employment, sales, industry, corporate affiliation, age and location. With computer capability, Birch made the following conclusions:

-Eighty percent of new jobs were created by firms with 100 or fewer employees.

-Small, independent firms generated 52 percent of new jobs.

-Eighty percent of the replacement jobs were created by establishment four years old or younger.

-Job loss occurs at about the same rate in states and cities--approximately 8 percent annually; thus, the difference between growing and declining areas is due to the rate at which lost jobs are replaced by new firms and expansion of existing ones.

---

[10]David L. Birch, Job Creation in Cities, (Cambridge, Massachusetts, 1980), pp. 30-31.

-Few firms relocate in the simple logistical sense of hiring a moving van and moving some distance.

-Businesses seem to be growing in places with higher rather than lower property taxes.

-A large college population is a dominating characteristic of areas with many small-business start-ups, and conversely, places with few college students are avoided.

-Manufacturers appear to be flocking to young remote areas whose present base is in the service sector. They are avoiding the older, industrial-revolution communities where once they flourished.

-Service companies are, in general, settling in the younger, growing metropolitan areas that offer a skilled workforce.[11]

Birch showed that the net effect of firm migration or relocation on an area was negligible. Areas that are declining in employment do not do so because of higher job loss, but because they are not competing effectively for new jobs. Commonly, our fastest growing areas have the highest losses. Stability, therefore, is not necessarily a healthy sign. At heart, Birch's data showed that smaller businesses offset their higher failure rates with the capacity to start up and expand dramatically. Birch's work demonstrated that the United States business sector has a tremendous, unique capacity for risk-taking in comparison with other countries.

The key to understanding the relationship between external conditions and business growth, Birch Indicated lies in bridging the gap between net effect and underlying changes in individual firms. The first step in the bridging process is to recognize that conditions which are refered to as "recession" or "expansion" or "unemployment" are

---

[11] David L. Birch, Choosing a Place to Grow: Business Location Decisions in the 1970's, (Cambridge, Massachusetts, 1981), pp. 23-32.

conglomerate effects that reflect changes in a larger set of economic components that includes interest rates, defense expenditures, the availability of venture capital, inflation, etc.

Secondly, the sources of new employment change--births, deaths, expansions and contractions of firms--must be separated out in a similar manner to reflect the larger set of economic components.

The data that Birch used was organized in a manner that makes a time series analysis both possible and relatively easy to do. The data cover a period of time (1969-76) during which the economy fluctuated significantly. Further, the data are grouped into three sub-periods which coincide very closely with the major economic phases of the period--specifically, a mixed interval accompanying the gradual withdrawal from Vietnam (1969-72), a post-conflict expansionary period (1972-74), and a recession (1974-76). Table 3 summarizes several different measures of the economy during the years 1969 to 1976.[12]

From a developmental standpoint an important element in job growth suggests that states should concentrate resources on assisting firms already functioning within their boundaries.

---

[12]David L. Birch and Susan MacCracken, Corporate Evolution: A Micro-Based Analysis, (Cambridge Massachusetts, 1981) pp. 36-38.

TABLE 3

VARIOUS MEASURES OF THE CONDITION OF THE ECONOMY, 1969 - 1976

Measures of the Economy	1969	1970	1971	1972	1973	1974	1975	1976
Percent Change in Real GNP	2.6	-.3	3.0	5.7	5.5	-1.4	-1.3	5.7
Bank Rates on Short Term Business Loans	7.9	8.5	6.0	5.6	7.4	11.2	8.2	7.4
Defensive Expenditures	79.4	78.6	75.8	76.6	74.5	77.8	85.6	89.4
New Venture Capital Committed	171	97	95	62	56	57	10	50
Common Stock Initial Public Offerings	1,298	566	446	646	177	55	25	45

Source: David L. Birch and Susan MacCracken, Corporate Evolution: A Micro-Based Analysis (Cambridge, Massachusetts, 1981), p. 38.

The general employment effect reflects what we would intuitively expect--that is, an average growth rate in the mixed period of 1969-72, increased employment in the expansionary period from 1972-74, and a steep fall back during the recession of 1974-76 (see Table 4). The pattern mirrors the rate of change in the GNP during the same period (see Table 3). The effect in terms of firms tells a somewhat different story, though, and indicates that a closer look is necessary in order to truly understand the impact of the general economic climate--particularly the '74 recession--upon the job generation process.

TABLE 4

NET CHANGE IN EMPLOYMENT AND NUMBERS OF ESTABLISHMENTS, BY SIZE AND TYPE, THREE YEAR INTERVALS, 1969 - 1976

Company Size and Type	Net Employment Change For:		
	1969-72	1972-74	1974-76
All Establishments	4.0%	6.7%	2.2%
Business Size (Employees)			
Small (0-20)	22.5	11.9	5.0
Medium (51-100)	- 1.8	4.4	- 0.9
Large (Over 500)	- 5.7	4.2	4.2
Business Type			
Service	10.1	14.7	18.4
Trade	14.0	6.8	2.2
Manufacturing	- 3.0	4.6	- 3.3
Percent Net Change in Establishments For:			
All Establishments	- 3.0%	1.1%	- 5.6%
Business Size (Employees)			
Small (0-20)	- 3.4	1.0	- 6.3
Medium (51-100)	- .3	2.1	- 1.7
Large (Over 500)	- 2.5	3.8	3.5
Business Type			
Service	- .8	6.6	.3
Trade	- 4.0	- .8	- 7.1
Manufacturing	- 3.3	- .5	- 6.8

Source: David L. Birch and Susan MacCracken, Corporate Evolution: A Micro-based Analysis (Cambridge, Massachusetts, 1981), p. 40.

Additional analysis of the data revealed two conclusions. First, the 1969-72 period was strange. Small firms grew at a high rate, benefiting from the abundance of venture capital. On the other hand, larger firms--many of which were involved in the defense industry--fared very poorly, a situation which can be attributed in part to rapid de-escalation of Vietnam-related military expenditures during this

period. These patterns are interesting in themselves, especially the extremely high rates of growth among small firms. But they do suggest that for purposes of comparison, the two other periods are better indicators of the effect of recession.

Secondly, it is obvious that the '74 recession did indeed have a very significant effect upon the economy. As Table 4 shows, both total employment and the total number of firms in operation fell dramatically after 1974. Equally clear, however, is the fact that different types and sizes of businesses fared quite differently within the context of this general impact. Specifically, it was found that:

1) The rate of change in terms of establishments is greater than in terms of employment. In percentage terms, more firms were lost during the recession than were jobs.

2) Even during a recession, small businesses play a critical role in job creation.

3) American business, on the whole, is shifting from being a producer of goods to being a producer of services, and this tendency is exaggerated during recession. The average worker no longer makes or grows something, but teaches, types or trades, particularly during bad times.[13]

The first finding is a reflection of the relative role of small businesses in the American economy in terms of sheer number and employment capabilities. While 88 percent of all businesses in the United States in 1976 had fewer than 20 employees, only 26 percent of total employment was within the fewer than 20 employees group.

As the data indicate, entrepreneurship in the United States remains undaunted despite the fact that small firms once in existence, all too often lack the capital necessary to survive economic blows such as were

---

[13] Ibid., pp. 39-40.

dealt by the most prodigious job creators. During the 1974-76 period, small businesses (those with under 20 employees) still generated 65 percent of the net new jobs, and produced slightly more jobs than those with over 500 employees.

The findings have critical implications for local economic development. Indianapolis appears to be a very good place to get started in general, but has a less favorable environment when time comes for firms, especially manufacturing, to expand. They tend to die, stagnate, relocate, or be acquired by out-of-state firms.[14]

The local economy reflects conditions occurring at a national level except, that in certain key areas, local conditions are exaggerated, either positively or negatively. Across the nation, the service sector now dominates the job generation process; Indianapolis is no different. In fact, Indianapolis excels in the service sector. Nationally, manufacturing firms are on the decline due to high production costs. Statistics for Indianapolis reflect that situation except, unfortunately, the decline is even greater than the national average.[15]

Skills and Knowledge Needed by Tomorrow's Workers

Economic development is keyed to local resources, local industry, local educational institutions, and above all, the skills and expertise of local people. The long-term economic growth of a state is keyed to filling gaps in the local system through attention to education, the engineering schools, technical colleges/community colleges, university research capabilities, industry/university connections, providing space

---

[14] Central Research Systesm, p. 17.

[15] Indiana Labor Market, Trends, Indiana Employment Security Division, 2nd Quarter 1982, pp. 1-5.

and venture capital for new companies, and an economic regulatory climate conducive to business development.

The areas of the country where universities are located are areas that can attract companies with research needs. Examples are the growth of companies in northern California near Stanford, in southern California where UCLA, and Cal Tech are located, and the Boston-Cambridge area where Harvard, MIT, and Boston College are located.

According to Bessire, if the following factors are present in the community, the electronics industry would find that community a good place to locate:

1. Geographic location in respect to universities and to the availability of cultural activities
2. Availability of technical manpower
3. Availability of skilled labor
4. Cost of labor; although, cost must also be considered in connection with productivity of the same
5. Market, or in other words, nearness of existing customers
6. Nearness to new markets
7. Location in respect to location of corporate headquarters
8. Plant sites, with utilities and other services
9. Transportation including all forms, particularly truck, rail and air freight with freight rates being of little consideration
10. Nearness of other research activities
11. Cost of living
12. Taxes
13. Above-average schools
14. Location of other company plants
15. Location of raw materials

16. Nearness of a technical library

17. Climate

18. Financing

19. Housing

20. Availability of data processing[16]

As was indicated by Bessire, education is an important item for the location of business and industry. Educational institutions are the agencies that impart skills and knowledge. As we look to the future, what types of skills and knowledge are likely to be needed?

Hunt indicates that business and industry will increasingly use robots. The increase in the number of robots will also increase the number of jobs in that field. The bulk of the jobs could be called "robotics technicians," although there are also drafting, mechanical engineering, and electrical and electronic technicians.

In the occupational profile of the jobs created by the robotic sector, well over half of all the jobs require two or more years of college training (See Table 5).[17] That is consistent with the occupational profile of the robot manufacturing industry, but it is still a startling revelation and attests to the high technology nature of robotics.

---

[16]Howard D. Bessire, A Handbook for the Eighties: Industrial Development (El Paso Texas: Hill Printing Co., 1981), pp. 196-197.

[17]H. Allan Hunt and Timothy L. Hunt, Human Resource Implications of Robotics (Kalamazoo, Michigan: W.E. Upjohn Institute, 1983), pp. 137-140.

TABLE 5
DIRECT JOB CREATION IN U.S.
DUE TO ROBOTICS, BY OCCUPATION, 1990

Occupation	Employment Range of Estimate	
	Low	High
Engineers	4,636	9,272
Robotics technicians	12,284	24,568
Other engineering technicians	664	1,328
All other professional and technical workers	936	1,871
Managers, officials, proprietors	1,583	3,166
Sales workers	581	1,162
Clerical workers	2,908	5,817
Skilled craft and related workers	2,163	4,326
Semi-skilled metalworking operatives	2,153	4,306
Assemblers and all other operatives	3,763	7,526
Service workers	138	276
Laborers	279	558
Total	32,088	64,176

Source: H. Allen Hunt and Timothy L. Hunt, Human Resource Implications of Robotics (Kalamazoo, Michigan, 1981), p. 147.

Levin stated that in considering where the jobs will be and the educational requirements of those jobs, we must avoid two fallacies. First, is the fallacy that equates "high technology" industries with jobs that require high skill levels and advanced education. Second, is the fallacy that assumes that the fastest growing job categories in terms of relative growth or percentage growth are also the ones that will provide the most new jobs in the future.[18]

Levin also suggests that high technology industry is very much open to debate, with several definitions. "(1) Those industries in which technology-oriented workers (engineers, scientists, etc.) accounted for a proportion of total employment that was at least one and a half times the

[18]Henry M. Levin, "Planning for Higher Education and Jobs in an Age of High Technology," Paper presented to the 1984 Governor's Conference on the Role of Higher Education in Indiana's New Economy, (January 12, 1984), p. 2.

average for all industries; (2) Those industries in which the ratio of R. & D. expenditures to net sale was at least twice the average for all industries; and (3) A combination of the criteria (1) and (2). Even when these industries were singled out, only a relatively small portion of jobs in such high tech industries required high tech workers in terms of skills and educational requirements. For example, in electronic components firms, only about 15 percent of the jobs were technologically oriented, with 61 percent of them being blue collar jobs. The computer and data processing industry had only one-quarter of its labor force in technically-oriented positions."[19]

The concern about education should really focus on the expansion of jobs in high technology occupations and in other higher level occupations, rather than in so-called high technology industries.

Will high technology require increased skills in those occupations? Levin indicated the available evidence suggests that the principal impact of micro-processors and robotics on traditional occupations will be to displace some workers and to reduce the skills of other workers.[20] The conclusion is consistent with the work on machine automation done in earlier periods where it was found that new production technologies tend to reduce skill requirements. The approach is also logical, since an investment in new capital can only be profitable if it reduces labor costs for any given output. Reduced labor costs can be derived from using fewer people in the production process, using persons with lower skill levels and wages, or some combination of these. It is the latter

---

[19]Ibid., p. 3.

[20]Ibid., p. 4.

that seems most applicable, as the analysis of the application of computers and robots suggests.

Here are two examples:[21] Secretaries are being replaced by word processors at a very rapid rate. Traditionally, secretaries had to know the appropriate formats for reports and correspondence and had to be almost letter-perfect in their typing skills. In addition, they needed strong spelling skills and a basic understanding of grammatical usage. However, word processors can correct typing errors automatically, so letter-perfect typing and strong spelling are no longer required. Formats for different types of documents can be programmed into the word processor, and even grammatical revisions can be done through syntactical programs. The result is that many of the traditional functions of the secretary have been replaced by the machine. It should also be noted that the increased productivity of word-processing reduces the need for office workers. Moreover, the shift from a typewriter to a word-processor requires relatively little training.

A second example is found in the field of computer programming. Not only were earlier computers larger and more expensive than today's computers, but they were far more cumbersome to program. The power of the technology itself has displaced many of the earlier skills required of the programmer with the transition from circuit logic and plug boards to machine language, macro-assembly languages, scientific and business-oriented user languages, and the relatively simple languages that are in use today. In increasing numbers of cases, powerful software packages enable highly sophisticated applications to broad classes of problems, with the programmer only required to provide data and select

---

[21] Vincent E. Giulianna, "The Mechanization of Office Work," Scientific American, (September, 1982), p. 152.

from among a menu of options. And, even present programming languages will be replaced with "natural" languages--the language of the user--, simple mechanical devices such as computer "mouse" and voice recognition.

Dimancescu has taken strong exception to the work of Levin and has indicated that two predominant myths have developed.

1) Growth of high technology industries will solve our unemployment problem and replace old industries

2) The new technologies are leading to permanent structural employment and to a general deskilling of the workforce[22]

The origins of myth one were in a belief that the Route 128, Silicon Valley or Triangle Park stories were but the tip of an iceberg of high tech employment opportunities for all Americans. High tech jobs, the myth stated, would displace old industry jobs. Nothing could be further from the truth.

A high tech industry is one in which a very high proportion of employees are trained in technical, engineering or scientific skills. Alternatively, one might use a companion characteristic that high tech industries are those that spend a high proportion of sales dollars on research. This can range from 5-15 percent in high tech firms.

The employment characteristic is more telling, however, because the characteristic tells people something about the educational component of the industry. In the electronics field, a high tech firm will have a work force with 20-30 percent of its employees having BS degrees or higher (mostly in electrical engineering and computer science); another 30 percent will have technical education; the final third will be

---

[22]Dan Dimancescu, "A New Economic Future and the Innovation Process," Paper Presented to the 1984 Governor's Conference on the Role of Higher Education in Indiana's New Economy (January 12, 1984), pp. 3-4.

unskilled. Such a profile implies that knowledge is the most vital ingredient to survival.

Myth two is argued in the first case by the people who are threatened and indeed displaced by the advent of automation and robotics. Researchers at Carnegie-Mellon University have suggested that by 1990 the theoretical potential exists for a loss of 4,000,000 jobs as a result of production line and office automation of all the tasks that could be replaced by current technology. A more realistic evaluation, in the case of robotics, nearer to 100,000-200,000 by 1990. This will be ameliorated by a job creation in the robotics industry of 30,000 - 60,000 new jobs. One reason for the more modest evaluation is the high cost of introducing robotics into production lines and the attendant lag time and training cost of workers, managers, and service people.[23]

Another important fact about myth two is more problematic. The problem has to do with the charge that the accelerated arrival of the new technologies is leading to a deskilling of American workers and to a growing gap between the best paid and least well paid.

Dimancescu indicates, Levin is highly misleading, and the arguments should be viewed with a great deal of skepticism.

Levin has also indicated that a massive number of low-skilled jobs are being created while a few coveted high-paid "elitist" jobs are forthcoming in the high tech sector. Levin suggests that auto servicemen

---

[23] Ibid., p.4.

will become mere appendages to electronic diagnosing equipment. With the sophistication of car repair today the observation may not be true. What may be found are "skilled" mechanics who are far from skilled and indeed could greatly benefit from the possible arrival of electronic diagnostic machines. The machines might allow the mechanic to spend more time actually fixing a car at a more competitive cost.

More serious, however, is a mistake made by Levin of relying on 'data' without qualifying the nature and value of such data. Here is an example. The suggestion is made that low-paid, low-skilled jobs are booming. A list of 15 job headings released by the Department of Labor shows openings in 1980. For example, job openings for cashiers for the year 1980 is 617,973. That is a big number. The qualifier, however, is the word "opening." The data climb by one every time a job opening is announced. Cashiers, as well as most other of the 14 low-skilled categories, share a common characteristic: a high propensity to hire young high school age students and therefore to have a very high turnover rate. Each turnover becomes an opening and one added point to a statistic. In short, readers are not given a true annual job profile--the actual number of jobs would be far smaller.[24]

Dimancescu suggested that if there is something new about corporate American in the 80's, the new approach is that many firms are beginning to perceive the work-force as a strategic resource. Companies are realizing that what differentiates one competitive company from another is less and less the product itself, but more and more the people who make, sell, and service the product. This realization is due in part to the leavening effect of the new technologies on the product itself--the

---

[24]Ibid., p. 7-8.

same thing or service can now be offered by many suppliers who have access to the technology. The approach has given rise to a new corporate phenomenon: a view of education and training as having strategic value. Education is becoming a strategic resource. Who will provide that education? Another opportunity/responsibility awaits universities and colleges.[25]

Cetron describes the jobs of the future as changing in nature. American needs to make short- and long-term changes to avoid disastrous consequences.

The first step is to begin to encourage the unemployed to upgrade their skills and take lower-paying jobs as temporary solutions. The next step is to get the education system back on track to produce educated minds that accept the challenges of the future and want to learn more. Strong emphasis on education is necessary; however, education alone is not sufficient. Training for the occupations of tomorrow is also needed. Finally, Americans must admit past mistakes and do what it takes to make the country strong and stable in the future.

Maintaining a skilled work force will take an enormous expenditure of resources. Operating training programs in vocational, technical and industrial facilities 24 hours a day will eliminate much of the need for duplicating expensive equipment.[26]

Doyle and Levine indicated that corporate executives see the

---

[25]Ibid., p.9.

[26]Marvin J. Cetron, "Jobs with a Future," Nuestro, (September, 1983), p. 30.

production of tomorrow's workforce as one of the most important functions of the school. At one level, at least, the school is meant to be practical: if the school does not prepare the graduates for life after school, the educational system has served them poorly. To fail to prepare young people for the world beyond high school is dangerous for the individual and for the entire society. But what is proper preparation for the world beyond high school?

To the surprise of many educators, the corporate executives issue a call for liberal education--by which it means schooling that teaches students to think critically and analytically, to cooperate and communicate as well as compete, to assume responsibility for themselves, to solve problems, and to continue to learn. The business community does not need students who are narrowly trained; on the contrary, business and industry needs students who are broadly educated and able to assume a wide variety of roles in tomorrow's workplace.

All young people today need "higher-order" cognitive skills. In other words, people need to know how to think. In addition, today's young people need well-developed habits of work, of self-discipline, and of initiative--regardless of the academic or vocational objectives. In America, at least, future gains in educational productivity are likely to come not from more funding but from qualitative changes in the ways people learn and the seriousness with which they approach the task.

In tomorrow's workplace, success will go to the individuals who are flexible and adaptable. The typical employee entering the workforce today can expect multiple careers over a productive lifetime. The person

who is narrowly educated--or worse yet, uneducated--has little or no future.[27]

Mohrman suggests that human capital in the simplest term indicates that individuals and society invest in people as well as in physical capital to increase financial and nonmonetary income in the future. The knowledge and skills that people will need in the workplace for the 1990's will be the following:

1. Evaluation and analysis
2. Critical thinking
3. Problem solving (including math)
4. Organization and reference
5. Synthesis
6. Application to new areas
7. Creativity
8. Decision making with incomplete information
9. Communication skills in many modes[28]

Forbes explored the area of jobs and the related skills and described the results by placing jobs into two groups. One group of jobs are being automated out of existence, or the tasks that employees are expected to perform are changing automatically, such as by the use of

---

[27]Denis P. Doyle and Marsha Levine, "Business and the Public Schools: Observations on the Policy Statement of the Committee for Economic Development," Phi Delta Kappan, (October, 1985), p. 118.

[28]Kathryn Mohrman, "Liberal Learning is a Sound Human Capital Investment." Educational Record, (Fall, 1983), p. 56.

robotics, word processing and computers. The other group of jobs is low level and will require minimum training.

In reviewing the jobs that will require the use of technology, Forbes suggests that ten categories of thinking skills are needed.

1. Recognition of concepts
2. Recognition of relationships
3. Recognition of patterns
4. Reconstruction of information
5. Evaluation of information
6. Extrapolation of information
7. Problem solving
8. Knowledge of basic input/output process
9. Knowledge of content specific tasks
10. Knowledge of self as learner[29]

---

[29]Roy H. Forbes, "Thinking Skills: What are They? Can They be Taught? Why and How?" The Technology Teacher, (April, 1985), p. 5.

CHAPTER III

ORGANIZATION AND DESIGN OF THE STUDY

The purpose of the study was to determine the skills and knowledge that will be needed by future employees of business and industry in the Indianapolis MSA. The study was designed to examine the technical skills, the personal skills and the nature of work required by the employer.

An effort was not made to identify or assess all potential variables which may be needed by business and industry; the intent was to investigate the effects of selected variables among all of such potential variables.

Methodology and Procedure

The basic design of the study can be classified as a field study, with data gathered exclusively through confidential questionnaires. The sample for the study was defined as 500 businesses and industries located in the Indianapolis MSA, and selected on a random basis by Standard Industrial Code (SIC).

Instrumentation

A survey instrument (Appendix B) was developed for the study.

The instrument consisted of one open-end question and items scaled from one to five. The following items were scaled on the scale by business and industry representatives.

1. The importance job-related technical knowledge
2. The importance of good work habits ("working smart")
3. The importance of organizational skills
4. The importance of communication skills
5. The importance of mathematics skills
6. The importance of computer skills
7. The importance of problem solving skills
8. The importance of overall quality of work
9. The importance of quantity of work accomplished
10. The importance of reading ability
11. The importance of evaluation and analysis
12. The importance of critical thinking
13. The importance of creativity
14. The importance of decision making with incomplete information
15. The importance of knowledge across trade lines

A second phase of the survey instrument was designed to allow business and industry representatives to rate various personal skills. The questions were as follows:

1. How would you rate employee attendance
2. How would you rate employee punctuality
3. How would you rate employee attitude toward job
4. How would you rate employee ability to follow instructions
5. How would you rate employee ability to work without supervision
6. How would you rate employee cooperation with other workers

7. How would you rate employee cooperation with management
8. How would you rate employee personal appearance, dress
9. How would you rate employee self-discipline and self-reliance
10. How would you rate employee tolerance for ambiguity (tolerance for not having all answers)
11. How would you rate employee ability to learn

A third phase of the instrument was designed to access the nature of work. Companies were asked to rate the following:

1. What is the minimum level of education you will require for most technical positions?
2. Are the skills required to perform most jobs becoming more narrow or more broad in scope?
3. Are most of your jobs becoming more complex or more simple?
4. Will the number of skilled jobs decrease or increase?
5. It is predicted that the number of young people available for work will decline drastically in the next decade. Would this trend affect your business?
6. It is predicted that employees will retire early in their lifetime and look to second careers in mid-life. Would this trend have an important affect on your business?
7. How important do you feel postsecondary education opportunities are as a primary reason for selecting a location to do business?

Validation Procedures

The instrument was pretested by representatives of two industries and by five representatives of a two-year postsecondary college. The

pretesting of the instrument generated some new items, eliminated some items, and other items were reworded.

A review of the literature denoted supplementary material which was used for the expansion of questions on the instrument.

Data Collection Procedures

On May 12, 1986, a letter (Appendix A) and the survey instrument (Appendix B) were mailed to each of 500 businesses and industries in the Indianapolis MSA. The mailings were addressed by name to the address of the chief administrator. All respondents were requested to complete the instrument and return in the pre-addressed envelope.

Mailed instruments were coded with the SIC to facilitate the grouping of the instruments and for later analysis. The SIC's used were as follows: code 15 represented building construction; code 26 represented paper and allied industries; code 27 represented printing and publishing; code 28 represented chemicals and allied products; code 34 represented fabricated metal products; code 35 represented non-electrical machinery; code 36 represented electrical and electronic equipment; code 39 represented represented miscellaneous manufacturing industries; code 42 represented motor freight transportation and warehouse; code 45 represented transportation by air; code 47 represented transportation services; code 48 represented communications; code 50 represented wholesale - durable goods; code 51 represented wholesale - non-durable goods; code 52 represented retail/building materials and hardware; code 55 represented automotive dealers and service stations; code 58 represented eating and drinking stores; code 59 represented miscellaneous retail; code 61 represented credit agencies other than banks; code 62

represented security and commodity brokers services, exchanges and services; code 63 represented insurance carriers; code 64 represented insurance agents and services; code 65 represented real estate; code 70 represented hotels and motels; code 72 represented personnel services; code 73 represented business services; code 75 represented automobile repair and services.

For table distribution the codes were then grouped into like functions as close as could be represented based on the surveys returned. The groupings are as follows:

1. Codes 15,26,27,28 were identified as non-durable goods manufacturing.
2. Codes 34, 35, 36, 39 were identified as machinery and metalworking.
3. Codes 42, 45, 47, 48 were identified as transportation and utilities.
4. Codes 50, 51 were identified as wholesale trade.
5. Codes 52, 55, 58, 59 were identified as retail trade.
6. Codes 61, 62,.63, 64, 65 were identifeid as finance, insurance and real estate.
7. Codes 70, 72, 73, 75 were identified as services.

Data Analysis Procedures

Tables were formulated to summarize responses to individual items according to the SIC's. Total responses, percent of totals, and average response for each SIC were reported in each table.

An average response figure was calculated in order to provide a measure of the relative strength of responses in each SIC. Average response was calculated by multiplying the numerical value times the number of responses per interval. Values for each interval were then

totaled and the results divided by the total number of respondents in the SIC. The value provides a basis for comparing responses between SIC's, or to the businesses and industries as a whole.

CHAPTER IV

ANALYSIS OF DATA

The purpose of the study was to determine the skills and knowledge needed by business and industry in the Indianapolis, Indiana area as identified through surveys, interviews and research. A comparison was made of the perceptions of business and industry personnel and classified into selected Standard Industrial Code (SIC) groupings. Total responses, percent of totals, and average response for each SIC grouping were reported in each table.

Tables were also presented of the top five rated needed technical skills and needed personal skills.

A total of 152 instruments (30 percent) were returned. As shown by the data in Table 6, the finance, insurance and real estate area had the largest number of respondents with 32, and transportation and utilities were represented by the smallest number of respondents with 15.

Current Trends in Technical and Personal Skills

The data concerning the technical and personal skills needed by business and industry were ranked to reflect the top five in each category. Table 7 represents the technical skills, and table 8 represents the personal skills.

TABLE 6

RESPONSE FROM ALL BUSINESS/INDUSTRY PERSONNEL

SIC Grouping	Number of Responses	Percent of Responses
Non-durable Goods Manufacturing	19	12.5
Machinery and Metalworking	16	10.5
Transportation and Utilities	15	9.9
Wholesale Trade	25	16.4
Retail Trade	20	13.2
Finance, Insurance and Real Estate	32	21.1
Service	25	16.4
Totals	152	100.0

TABLE 7

TOP FIVE RANKING OF TECHNICAL SKILLS NEEDED BY FUTURE EMPLOYEES

Rank	Skill	Mean	Standard Deviation
1	Good Working Habits	4.7	0.511
2	Overall Quality of Work	4.6	0.54
3	Communication Skills	4.4	0.79
4	Organizational Skills	4.2	0.86
5	Problem-Solving Skills	4.2	0.82

TABLE 8

TOP FIVE RANKING OF PERSONAL SKILLS
NEEDED BY FUTURE EMPLOYEES

Rank	Skill	Mean	Standard Deviation
1	Attendance	4.8	0.41
2	Attitude Toward Job	4.7	0.56
3	Ability to Follow Instructions	4.7	0.55
4	Punctuality	4.7	0.58
5	Ability to Learn	4.64	0.52

Tables 7 and 8 indicate that employers must want employees with good working habits and good attendance on the job. Next in importance are employees with good quality of work and a good attitude toward the job.

Perceived Importance of Technical Skills and Knowledge in Hiring Future Employees

Data summarized in Table 9 shows that the degree of importance of job-related technical knowledge in hiring future employees, had a positive average response of 3.9 for the SIC groups as a whole. An average response of 4.2 for transportation and utilities made that group the highest of the seven groups. The lowest average response rate was represented by the retail trade group with a 3.6 on the five point scale. In observing the importance of job-related technical knowledge in hiring future employees 63.7 percent of the respondents rated the item with a four or five.

TABLE 9

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF JOB-RELATED TECHNICAL KNOWLEDGE IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	2	3	7	6	18	3.9
Machinery and Metalworking	0	0	4	6	5	15	4.1
Transportation & Utilities	0	0	4	3	7	14	4.2
Wholesale Trade	0	2	5	5	12	24	4.1
Retail Trade	0	0	13	2	5	20	3.6
Finance, Insurance & Real Estate	1	1	9	8	12	31	3.9
Services	2	1	7	3	10	23	3.8
Total Number	3	4	45	34	57	143	3.9
Percent of Totals	2.1	2.7	31.5	23.8	39.9	100.0	

Employers were asked if good work habits are important in the hiring of future employees. Responses were summarized in Table 10. Over 97 percent of the employers indicated good work habits were important in the work environment.

The average response for all SIC groups were 4.7. The lowest ranked group out of the seven categories was transportation and utilities with a 4.5. Good work habits was the highest raned item under technical skills needed by future employees by business and industry.

TABLE 10

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF GOOD WORK HABITS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	0	3	16	19	4.8
Machinery and Metalworking	0	0	0	5	11	16	4.7
Transportation & Utilities	0	0	1	6	8	15	4.5
Wholesale Trade	0	0	1	3	21	25	4.8
Retail Trade	0	0	1	3	21	25	4.8
Finance, Insurance & Real Estate	0	0	1	4	27	32	4.8
Services	0	0	0	6	19	25	4.8
Total	0	0	4	30	117	151	4.7
Percent of Totals	0	0	2.6	19.9	77.5	100.0	

The importance of organizational skills were judged by employers as an item in hiring future employees. As shown in Table 11, 78.7 percent of the respondents indicated that organizational skills are important in hiring future employees. An average resonse rate of 4.2 on the five point scale was recorded for all seven groups of the sampled business and industries. The finance, insurance, and real estate group had the highest average response of 4.4. Retail trade had the lowest average response with a 4.0.

TABLE 11

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ORGANIZATIONAL SKILLS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	5	5	8	18	4.2
Machinery and Metalworking	0	1	4	6	5	15	4.2
Transportation & Utilities	0	0	3	5	7	15	4.3
Wholesale Trade	0	0	7	7	10	24	4.1
Retail Trade	0	1	3	11	5	20	4.0
Finance, Insurance & Real Estate	0	0	4	12	15	31	4.4
Services	0	0	4	9	12	25	4.3
Total	0	2	30	55	62	148	4.2
Percent of Totals	0	1.3	20.0	37.2	41.5	100.0	

The importance of communication skills in the hiring of future employees was also judged. As shown in Table 12, approximately 84 percent of the respondents indicated that communication skills are important to the various job responsibilities. An average response rate of 4.4 on the five point scale was recorded for all seven sampled groups. A 78.7 percent response rate was recorded for the ratings of a four or five, which indicates that organization skills are important.

TABLE 12

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF COMMUNICATION SKILLS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	2	7	10	19	4.4
Machinery and Metalworking	0	0	3	5	8	16	4.3
Transportation & Utilities	0	0	1	3	11	15	4.7
Wholesale Trade	0	0	2	9	13	24	4.5
Retail Trade	0	1	2	10	7	20	4.2
Finance, Insurance & Real Estate	0	2	4	6	20	32	4.4
Services	0	1	4	3	7	15	4.1
Total	0	4	18	43	76	141	4.4
Percent of Totals	0	2.8	12.8	30.5	53.9	100.0	

A slight majority of the surveyed personnel from business and industry also perceived that mathematics are important in hiring future employees. The data in Table 13, show that 51 percent of the respondents reported mathematics to be important by answering the item with either a four or five. The average response rate for the total group was 3.6.

TABLE 13

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF MATHEMATIC SKILLS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	7	10	2	19	3.7
Machinery and Metalworking	0	0	6	5	5	16	3.9
Transportation & Utilities	0	2	7	3	2	14	3.4
Wholesale Trade	0	4	9	8	4	25	3.5
Retail Trade	2	0	6	5	7	20	3.8
Finance, Insurance & Real Estate	0	3	12	10	5	23	3.3
Services	0	1	4	3	7	15	4.1
Total	2	14	57	46	29	148	3.6
Percent of Totals	0	2.8	12.8	30.5	53.9	100.0	

A study by Bennett reflected somewhat higher findings in the areas of communications and analytical skills.[30] The industrial ratings of the content area of skill in reading was 3.9, skill in listening was 3.85, and ability to write reports was 3.53 on a four point scale. Mathematics ranged from 3.69 for arithmetic, 3.55 for trigonometry, 3.53 for

[30]Stuart Reed Bennett, "Pre-Employment Training Requirements For Fluid Power Skilled Workers and Technicians," (unpublished Ph.D. dissertation, Texas A & M University, 1982).

geometry, 3.51 and 3.41 for algebra and ratios and propostion respectively on the 4.0 scale.

The overall importance of computer skills was not as great as one would expect. As shown in Table 14, only 42 percent of the respondents perceived computer skills to be very important (26.7% plus 15.1%). The group average was 3.1.

TABLE 14

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF COMPUTER SKILLS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	6	2	3	5	3	19	2.8
Machinery and Metalworking	1	2	6	2	4	15	3.4
Transportation & Utilities	0	2	5	5	3	15	3.6
Wholesale Trade	4	3	9	3	4	23	3.0
Retail Trade	5	1	7	2	2	17	2.7
Finance, Insurance & Real Estate	1	1	11	13	4	30	3.6
Services	3	5	4	7	1	20	2.9
Total	20	16	45	37	21	139	3.1
Percent of Totals	14.4	11.5	32.3	26.7	15.1	100.0	

Business and industry personnel were asked to indicate the degree of importance of problem solving skills in hiring future employees. As

shown in Table 15, 83 percent of the respondents rated the item as a four or five to indicate problem solving skills are important. Average response for services and transportation and utilities was the highest of the seven units with 4.3 each. The overall average response was 4.2.

TABLE 15

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF PROBLEM SOLVING SKILLS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	3	13	3	19	4.0
Machinery and Metalworking	0	0	2	10	4	16	4.1
Transportation & Utilities	0	0	1	9	5	15	4.3
Wholesale Trade	0	1	7	8	9	25	4.0
Retail Trade	0	0	4	8	8	20	4.2
Finance, Insurance & Real Estate	0	0	4	15	11	30	4.2
Services	0	0	3	12	9	24	4.3
Total	0	1	24	75	49	149	4.2
Percent of Totals	0	.6	16.1	50.4	32.9	100.0	

Training can be an important element in problem-solving skills according to a study conducted by Clinton. Study data, compiled from post-session test results during two workshops held in the state of Georgia for practicing instructional supervisors, indicated that training

did improve the problem identification skills of educational leaders. It was found that instructional supervisors without training had a mean score of 5.4 in problem identification skills as measured by the Clinton Assessment of Problem Identification for Instructional Supervisors (CAPIS) and instructional supervisors with training have a mean score of 18.8.[31]

In the current study business leaders were asked to rate the degree of importance of overall quality of work in hiring future employees. As shown by the data in Table 16, the leaders indicated that the overall quality of work was a very important item. A positive average response of 4.6 was noted for the group as a whole. Non-durable goods manufacturing has the highest rating with 4.8.

The quantity of work to be accomplished by employees was also rated. A comparison of the responses by the various personnel from each of the seven groups were reported in Table 17. One hundred and eighteen people, or 79 percent, indicate a four or a five on the five point scale that quantity of work accomplished is important. The overall response average was 4.1. The ratings by the seven groups were very even with three groups rating the item as a 4.0 and four groups rating the item as 4.1.

---

[31]Barbara Jeanne Clinton, "Development and Validation of an Instrument to Assess Problem Identification Skills of Instructional Supervisors," (unpublished Ed.D. dissertation, University of Georgia, 1981).

TABLE 16

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF OVERALL QUALITY OF WORK IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	0	3	16	19	4.8
Machinery and Metalworking	0	0	0	6	10	16	4.6
Transportation & Utilities	0	0	1	5	9	15	4.5
Wholesale Trade	0	0	1	8	15	24	4.6
Retail Trade	0	0	2	4	14	20	4.6
Finance, Insurance & Real Estate	0	0	0	10	21	31	4.7
Services	0	0	1	6	18	25	4.7
Total	0	0	5	42	103	150	4.6
Percent of Totals	0	0	3.3	28.0	68.7	99.9	

The response rating on the importance of overall quantity of work accomplished reflected a high percentage of four ratings with 51.7 percent or 77 total responses rating the item with a four. Thirty-one responses or 20.7 percent was represented with ratings of three or less. The employers perceive that quality of work accomplished is important in hiring future employees.

TABLE 17

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF OVERALL QUANTITY OF WORK IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	2	13	4	19	4.1
Machinery and Metalworking	0	0	4	7	4	15	4.0
Transportation & Utilities	0	0	4	6	5	15	4.1
Wholesale Trade	0	2	3	13	6	24	4.0
Retail Trade	1	0	2	11	6	20	4.1
Finance, Insurance & Real Estate	0	1	5	16	9	31	4.1
Services	0	0	7	11	7	25	4.0
Total	1	3	27	77	41	149	4.1
Percent of Totals	.6	2.0	18.1	51.7	27.5	99.9	

When asked, the responding business and industry leaders also perceived that reading ability is an important skill in hiring future employees. As shown in Table 18, 77 percent of the respondents indicated that reading ability is important in hiring future employees. An average of 3.9 from the non-durable goods manufacturing area was the lowest of the seven groups; and finance, insurance, and real estate had the highest rating with 4.4. A positive response of 4.2 was noted for the groups as a whole.

TABLE 18

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF READING ABILITY IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	6	8	4	18	3.9
Machinery and Metalworking	0	0	5	4	7	16	4.1
Transportation & Utilities	0	0	2	6	7	15	4.3
Wholesale Trade	0	0	6	10	9	25	4.1
Retail Trade	1	0	4	6	9	20	4.1
Finance, Insurance & Real Estate	0	0	2	15	15	32	4.4
Services	1	1	6	5	11	24	4.0
Total	3	1	31	54	62	150	4.2
Percent of Totals	1.0	.6	21.0	36.0	41.4	100.0	

Employers from business and industry were asked if evaluation and analysis were important technical skills that were taken into consideration in hiring employees. The importance of this skill is summarized in Table 19. As reported in Table 19, 54.2 percent of the respondents indicated that evaluation and analysis skill was important to very important. The industry group of machinery and metalworking has the highest average response rate of 4.7. The lowest average response rate was 3.1 which was recoreded by the finance, insurance and real estate group. The average response for the total group was 3.6.

TABLE 19

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF EVALUATION AND ANALYSIS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	1	8	6	1	16	3.4
Machinery and Metalworking	0	0	5	4	6	15	4.7
Transportation & Utilities	0	1	7	6	1	15	3.5
Wholesale Trade	1	1	10	10	3	25	3.5
Retail Trade	0	1	8	6	5	20	3.8
Finance, Insurance & Real Estate	0	1	9	14	7	31	3.1
Services	0	2	11	5	4	22	3.3
Total	1	7	58	51	27	144	3.6
Percent of Totals	.6	4.9	40.3	35.4	18.8	100.0	

When asked to indicate the extent that critical thinking is important in the hiring of future employees, respondents perceived critical thinking as somewhat important, with 51 percent rating the item as a four or five. (See Table 20). The average response rate was 3.7, with finance, insurance, and real estate recording the highest average response rate of 4.2.

TABLE 20

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF CRITICAL THINKING IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	2	9	5	2	18	3.4
Machinery and Metalworking	1	0	6	4	5	16	3.8
Transportation & Utilities	0	1	7	6	1	15	3.5
Wholesale Trade	0	1	12	9	3	25	3.6
Retail Trade	0	1	7	6	5	19	3.8
Finance, Insurance & Real Estate	0	3	8	15	6	32	4.2
Services	0	1	12	4	3	20	3.5
Total	1	9	61	49	25	145	3.7
Percent of Totals	.6	6.2	42.2	33.8	17.2	100.0	

Business and industry personnel were asked if creativity is an important skill needed by employees that would be hired in the future. As summzarized in Table 21, the retail trade group reflected the highest response average with 4.1. Fifty-nine percent with the business and industry personnel indicate positive response of a rating of either a four or five on the five point scale. The average response for the total group was 3.7.

TABLE 21

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF CREATIVITY IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	Very Important 4	5	Total n	Average Response
Non-Durable Goods Manufacturing	1	2	6	4	5	18	3.6
Machinery and Metalworking	0	3	5	3	4	15	3.5
Transportation & Utilities	0	1	5	7	2	15	3.7
Wholesale Trade	0	5	6	10	4	25	3.5
Retail Trade	0	0	6	7	7	20	4.1
Finance, Insurance & Real Estate	2	1	11	11	7	32	3.6
Services	0	0	7	9	7	23	4.0
Total	3	12	46	51	36	148	3.7
Percent of Totals	2.0	8.1	31.1	34.5	24.3	100.0	

The degree of importance of decision-making with incomplete information was also a skill to be rated in the hiring of future employees. As shown in Table 22, 41.3 percent of the respondents indicated that the skill was important to very important. An average response rate of 3.4 on the five point scale was recorded for all seven groups of the sampled businesses and industries. The services group had the highest average response with 3.8.

TABLE 22

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF DECISION MAKING WITH INCOMPLETE INFORMATION IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	4	6	7	1	18	3.3
Machinery and Metalworking	0	2	9	3	1	15	3.2
Transportation & Utilities	1	0	6	6	2	15	3.5
Wholesale Trade	3	4	10	7	0	24	2.9
Retail Trade	0	1	10	5	3	19	3.5
Finance, Insurance & Real Estate	1	4	11	7	4	27	3.3
Services	0	0	12	7	6	25	3.8
Total	5	15	64	42	17	143	3.4
Percent of Totals	3.5	10.5	44.8	29.4	11.8	100.0	

The degree of importance of knowledge across trade lines in hiring future employees was generally not as positive as that for other technical skills. Knowledge across trades lines was rated important or very important by 25 percent of the respondents as shown in Table 23. The middle response was 40.8 percent, and 34.2 percent of the respondents indicated the skill was not important. Machinery and metalworking had the highest average response with 3.6. An average response rate of 2.9 on the five point scale was recorded for all seven groups of the sampled employers.

TABLE 23

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF KNOWLEDGE ACROSS TRADE LINES IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	Very Important 4	5	Total n	Average Response
Non-Durable Goods Manufacturing	4	2	6	1	1	14	2.5
Machinery and Metalworking	0	2	4	5	3	14	3.6
Transportation & Utilities	0	2	4	2	0	8	3.0
Wholesale Trade	2	6	6	7	0	21	2.9
Retail Trade	1	3	8	1	1	14	2.9
Finance, Insurance & Real Estate	4	2	9	1	1	17	2.6
Services	2	7	7	4	0	20	2.9
Total	13	24	44	21	6	108	2.9
Percent of Totals	12.0	22.2	40.8	19.4	5.6	100.0	

Perceived Importance of Personal Skills In Hiring Future Employees

Business and industry personnel were asked to rate the importance of attendance as a criteria for hiring future employeees. The item received the highest rating of the listed skills and knowledge on the survey. The overall average response rating for the item as shown in Table 24, was 4.8. Over 80 percent of the respondents rated the importance of attendance as a five on the five-point scale.

TABLE 24

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ATTENDANCE IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	1	7	11	19	4.5
Machinery and Metalworking	0	0	0	2	15	17	4.9
Transportation & Utilities	0	0	0	3	12	15	4.8
Wholesale Trade	0	0	2	5	8	15	4.4
Retail Trade	0	0	0	0	20	20	5.0
Finance, Insurance & Real Estate	0	0	0	7	26	33	4.8
Services	0	0	0	1	24	25	4.96
Total	0	0	3	25	116	144	4.8
Percent of Totals	0	0	2.1	17.3	80.6	100.0	

Employers were asked the degree of importance of punctuality in the hiring of future employees. As shown by the data in Table 25, the employers were in general agreement that punctuality is a personal skill that is desired in the hiring of future employees. A positive average response of 4.6 was noted for the groups as a whole. An average response of 4.8 for retail trade and services was the highest of the seven groups.

TABLE 25

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF PUNCTUALITY IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	0	4	15	19	4.4
Machinery and Metalworking	0	0	3	3	10	16	4.4
Transportation & Utilities	0	0	0	6	9	15	4.6
Wholesale Trade	0	0	3	4	18	25	4.6
Retail Trade	0	0	0	5	15	20	4.8
Finance, Insurance & Real Estate	0	0	1	9	23	33	4.7
Services	0	0	1	3	20	24	4.8
Total	0	0	8	34	110	152	4.6
Percent of Totals	0	0	5.2	22.4	72.4	100.0	

Survey respondents indicated that one of the most important personal skills desired in employees is attitude toward the job. The degree of importance is reported in Table 26.

The respondents indicated very high rating by each SIC group. The average response rate for all the group together was 4.8. Approximately 83 percent of the employers rated the item as very important.

TABLE 26

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ATTITUDE TOWARD JOB IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	0	5	13	18	4.7
Machinery and Metalworking	0	0	0	2	14	16	4.9
Transportation & Utilities	0	0	0	1	14	15	4.9
Wholesale Trade	0	0	0	4	21	25	4.8
Retail Trade	0	0	0	5	15	20	4.8
Finance, Insurance & Real Estate	0	0	1	6	26	33	4.8
Services	0	0	0	2	23	25	4.9
Total	0	0	1	25	126	152	4.8
Percent of Totals	0	0	0.7	16.4	82.9	100.0	

As reported in Table 27, the degree of importance of the ability to follow instructions in hiring future employees was rated high. Of 152 business and industry leaders, 101 rated this personal skill as a five, with approximately 94 percent of the employers rating the item as a four or five on the five point scale. The average response for each of the groups was 4.6. The service group had the highest individual group rating with 4.8.

TABLE 27

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ABILITY TO FOLLOW INSTRUCTIONS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	4	6	9	19	4.3
Machinery and Metalworking	0	0	1	3	12	16	4.7
Transportation & Utilities	0	0	3	3	8	14	4.4
Wholesale Trade	0	0	0	7	18	25	4.7
Retail Trade	0	0	1	5	14	20	4.7
Finance, Insurance & Real Estate	0	0	0	13	20	33	4.6
Services	0	0	0	5	20	25	4.8
Total	0	0	9	42	101	152	4.6
Percent of Totals	0	0	5.9	27.7	66.4	100.0	

Responding business and industry leaders were asked to indicate the degree of importance of the ability to work without supervision in hiring future employees and as shown in Table 28, 83.9 percent agreed that this is an important skill by rating the personal skill as a four or five on the five point scale. The average response figure for all business and industry leaders was 4.3 on the five point scale. The retail trade group recorded an average response of 4.5, which was the highest of all groups. The lowest rating was 3.8 by the transportation and utilities group.

TABLE 28

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ABILITY TO WORK WITHOUT SUPERVISION IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important			Very Important		Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	3	9	7	19	4.2
Machinery and Metalworking	0	0	3	7	6	16	4.2
Transportation & Utilities	0	0	7	4	4	15	3.8
Wholesale Trade	0	0	4	6	15	25	4.4
Retail Trade	0	0	0	10	10	20	4.5
Finance, Insurance & Real Estate	0	0	4	12	26	32	4.4
Services	0	0	2	11	12	25	4.4
Total	0	0	23	59	70	152	4.3
Percent of Totals	0	0	15.1	38.8	46.1	100.0	

As the data in Table 29 show, cooperation with other workers is an important personal skill desired by business and industry in the hiring of future employees. The wholesale trade group had the highest average response with 4.5. The non-durable goods manufacturing had the lowest average response rate with 4.2. The overall average response was 4.4.

TABLE 29

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF COOPERATION WITH OTHER WORKERS IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	2	11	6	19	4.2
Machinery and Metalworking	0	0	3	6	7	16	4.3
Transportation & Utilities	0	0	4	3	8	15	4.3
Wholesale Trade	0	0	0	11	14	25	4.6
Retail Trade	0	0	0	10	10	20	4.5
Finance, Insurance & Real Estate	0	0	5	9	18	32	4.4
Services	0	1	3	8	13	25	4.3
Total	0	1	17	58	76	152	4.4
Percent of Totals	0	0.6	11.2	38.2	50.0	100.0	

The survey population was also requested to rate the degree of importance of cooperation with management in hiring future employees. Table 30 indicates 92.7 percent of the respondents rated this personal skill as a four or five. The overall average response was 4.4, the same as the response rate for cooperation with other workers. The highest average response rate was with the retail trade group at 4.7, as compared with the 4.5 highest rating by the wholesale trade group in cooperation with other workers.

TABLE 30

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF COOPERATION WITH MANAGEMENT IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	2	12	5	19	4.2
Machinery and Metalworking	0	0	2	6	8	16	4.2
Transportation & Utilities	0	0	3	5	7	15	4.3
Wholesale Trade	0	0	1	11	11	23	4.4
Retail Trade	0	0	0	6	14	20	4.7
Finance, Insurance & Real Estate	0	0	2	11	20	33	4.5
Services	0	0	1	8	16	25	4.6
Total	0	0	11	59	81	151	4.4
Percent of Totals	0	0	7.3	39.1	53.6	100.0	

The degree of importance of personal appearance in the hiring of future employees was positive, but the personal skill was not as highly rated as other personal skills. As the data in Table 31 show, 69.1 percent of the responding personnel indicated that personal appearance was important by rating the skill with a four or five. The average response rate was 3.9 for all categories of respondents.

TABLE 31

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF PERSONAL APPEARANCE IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	7	8	4	19	3.8
Machinery and Metalworking	0	1	7	4	4	16	3.7
Transportation & Utilities	0	1	7	4	3	15	3.6
Wholesale Trade	0	0	8	10	7	25	3.96
Retail Trade	0	0	4	8	8	20	4.2
Finance, Insurance & Real Estate	1	0	5	18	8	32	4.0
Services	0	0	6	10	9	25	4.1
Total	1	2	44	62	43	152	3.9
Percent of Totals	0.6	1.4	28.9	40.8	28.3	100.0	

The degree of importance of self-discipline and self-reliance in hiring future employees was declared important by 84.2 percent of the respondents. Summarized data are shown in Table 32. The average response figure for all SIC groups was 4.2 on the five point scale. Although the services group responses averaged 4.4, the finance, insurance and real estate group responses were highest with an average of 4.5.

TABLE 32

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF SELF-DISCIPLINE AND SELF-RELIANCE IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	0	4	11	4	19	4.0
Machinery and Metalworking	0	0	3	5	8	16	4.3
Transportation & Utilities	0	0	4	7	4	15	4.0
Wholesale Trade	0	1	3	10	11	25	4.2
Retail Trade	0	0	4	6	10	20	4.3
Finance, Insurance & Real Estate	0	0	2	12	18	32	4.5
Services	0	0	3	8	14	25	4.4
Total	0	1	23	59	69	152	4.2
Percent of Totals	0	0.6	15.2	38.8	45.4	100.0	

The attitudes of the business and industry community toward the importance of tolerance for ambiguity were generally favorable as shown by the data summarized in Table 33. While a total of 66 percent of the responding employers rated the personal skill as a four or five on the five point scale, the rating was not as highly rated as the other personal skills. The average response of the services group was the highest with 4.4. The lowest average response was machinery and metalworking with 3.6. The average response figure for the seven classifications of SIC groups was 3.9.

TABLE 33

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF TOLERANCE FOR AMBIGUITY IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important				Very Important	Total n	Average Response
	1	2	3	4	5		
Non-Durable Goods Manufacturing	0	1	5	11	2	19	3.7
Machinery and Metalworking	0	1	7	6	2	16	3.6
Transportation & Utilities	0	1	5	6	3	15	3.7
Wholesale Trade	0	0	9	10	5	24	3.8
Retail Trade	0	0	7	6	5	18	3.9
Finance, Insurance & Real Estate	0	1	10	11	8	30	3.9
Services	0	0	3	8	14	25	4.4
Total	0	4	46	58	39	147	3.9
Percent of Totals	0	2.7	31.3	39.5	26.5	100.0	

As shown in Table 34, a strong majority (98 percent) of the respondents indicated that the ability to learn was very important in hiring future employees. Average response for the seven groups were 4.6 on the five point scale. The retail trade group had the highest average response rate at 4.8 with non-durable manufacturing and transportation and utilities having the lowest average rate at 4.5 respectively.

TABLE 34

FREQUENCIES AND AVERAGE RESPONSE SCORES RELATED TO THE IMPORTANCE OF ABILITY TO LEARN IN FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	0	0	0	9	10	19	4.5
Machinery and Metalworking	0	0	1	5	10	16	4.6
Transportation & Utilities	0	0	1	5	8	14	4.5
Wholesale Trade	0	0	0	8	15	23	4.7
Retail Trade	0	0	0	5	15	20	4.8
Finance, Insurance & Real Estate	0	0	1	8	24	33	4.7
Services	0	0	0	8	17	25	4.7
Total	0	0	3	48	99	150	4.6
Percent of Totals	0	0	2.0	32.0	66.0	100.0	

The Nature of Work Related to the Hiring of Future Employees

The nature of the minimum level of education that employers will require for most technical positions was investigated in this study. As the data in Table 35 show, a high school education was indicated as the minimum level of education by 55 percent of the respondents. Forty-five percent of the respondents reflected a desire to have future employees with a higher than high school level of education, with 37.2 percent desiring one to two years of postsecondary education, and 7.8 percent indicating that a bachelor's degree would be appropriate.

TABLE 35

MINIMUM LEVEL OF EDUCATION REQUIRED
FOR MOST TECHNICAL POSITIONS

Education Level	Total Responses	Percent of Total
High School	77	55.0
Two Years College	43	30.8
Bachelors Degree	11	7.8
One Year College	9	6.4
Masters Degree	0	0
Total Number of Responses	140	100.0

The degree to which skills required to perform jobs is becoming more narrow or more broad in scope was judged by business and industry leaders. As shown in Table 36, 65.7 percent replied that the jobs are becoming more broad by rating the area with a four or five on the five point scale. The average response figure for the seven groups as a total was 3.7. The highest average response rate of 3.9 was shared by the areas of machinery and metalworking, wholesale trade, retail trade and finance, insurance and real estate. The lowest average response rate was by one group, the non-durable goods manufacturing.

TABLE 36

DEGREE THAT SKILLS REQUIRED TO PERFORM JOBS ARE BECOMING NARROW OR BROAD FOR FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Narrow 1	2	3	4	Broad 5	Total n	Average Response
Non-Durable Goods Manufacturing	2	3	5	6	2	18	3.2
Machinery and Metalworking	0	1	3	8	4	16	3.9
Transportation & Utilities	2	1	3	5	3	14	3.4
Wholesale Trade	0	3	3	7	7	20	3.9
Retail Trade	0	3	2	5	6	16	3.9
Finance, Insurance & Real Estate	1	1	6	13	9	30	3.9
Services	0	2	6	9	6	23	3.8
Total	5	14	28	53	37	137	3.7
Percent of Totals	3.7	10.2	20.4	38.7	27.0	100.0	

As reported in Table 37, only a small percentage of respondents indicated that jobs in the future are becoming more simple. Moreover, the business and industry leaders indicated that jobs are overall becoming more complex, with 32.4 percent rating the question with a five and 48.9 percent of the respondents rating the questions as a four, on the five point scale. Non-durable goods manufacturing rated the question lowest with an average response rate of 3.7, while machinery and metalworking and finance, insurance and real estate reported the highest average response rating of 4.3 respectfully. The average response rate was 4.1 for all categories of respondents.

TABLE 37

DEGREE THAT JOBS ARE BECOMING MORE COMPLEX OR MORE SIMPLE FOR FUTURE EMPLOYEES, BY INDUSTRY GROUP

SIC Group	Simple 1	2	3	4	Complex 5	Total n	Average Response
Non-Durable Goods Manufacturing	1	0	3	12	2	18	3.7
Machinery and Metalworking	0	0	1	9	6	16	4.3
Transportation & Utilities	0	0	2	7	5	14	4.2
Wholesale Trade	0	0	4	10	7	21	4.1
Retail Trade	0	1	3	6	7	17	4.1
Finance, Insurance & Real Estate	0	0	4	13	13	30	4.3
Services	0	1	6	11	5	23	3.9
Total	1	2	23	68	45	139	4.1
Percent of Totals	0.7	1.4	16.5	48.9	32.4	100.0	

Business and industry leaders were also requested to respond to whether the number of skilled jobs will decrease or increase for future employees. The data as reported in Table 38 show, that 68.3 percent of the respondents indicated that the number of skilled jobs will increase.

It can be anticipated that training programs will be needed to meet the current and future trends of jobs becoming more broad, more complex and increased skill level. In the economy of the future, human capital must be seen in the same terms as physical capital needs.

TABLE 38

THE PERCENTAGE OF BUSINESS AND INDUSTRY RESPONDENTS WHO THINK THE NUMBER OF SKILLED JOBS WILL INCREASE OR DECREASE

Skilled Jobs Increase/Decrease	Total Responses	Percent of Total
Increase	95	68.3
Decrease	4	2.9
No Change	40	28.8
Total Number of Responses	138	100.0

The survey recipients were asked to respond to two trends in the work environment. The first trend was related to the prediction that the number of young people available for the work place will be declining and that this decline vill affect the business environment. The second trend concerns the prediction that employees will retire at an earlier age and look for second careers and that this trend will affect the business community. As shown in Tables 39 and 40, a slight majority of the respondents indicated the trends would not have an adverse affect on the business community, with 51.4 percent responding "no" to trend one and 52.1 percent responding "no" to trend two.

As more women go into the work place, the decrease in the number of young people and increase in the number of early retired people will tend to balance each other for a period of time.

TABLE 39

WILL THE DECLINE IN THE NUMBER OF YOUNG PEOPLE AVAILABLE FOR WORK AFFECT THE BUSINESS ENVIRONMENT?

Response	Total Responses	Percent of Total
Yes	68	48.6
No	72	51.4
Total Number of Responses	140	100.0

TABLE 40

WILL EARLY RETIREMENT OF EMPLOYEES HAVE AN IMPORTANT AFFECT ON THE BUSINESS ENVIRONMENT?

Response	Total Responses	Percent of Total
Yes	67	47.9
No	73	52.1
Total Number of Responses	140	100.0

The findings regarding the importance of postsecondary education opportunities as a primary reason for selecting a location in which to do business are presented in Table 41. Approximately 35 percent of the business and industry personnel indicated that the education opportunities were somewhat important to a company's decision to do business in a certain community. Another group (27.9 percent) indicated that education opportunities were not important in selecting a location.

On the positive side, 36.5 percent rated education opportunities as important to very important when selecting a community to do business. A positive average response of 3.1 was noted for the SIC groups as a whole. An average response of 3.6 for the transportation and utilities group was the highest of the seven groups.

Table 41

FREQUENCIES AND AVERAGE RESPONSE SCALES RELATED TO THE IMPORTANCE OF POSTSECONDARY EDUCATION OPPORTUNITIES AS A PRIMARY REASON FOR SELECTING A LOCATION TO DO BUSINESS, BY INDUSTRY GROUP

SIC Group	Not Important 1	2	3	4	Very Important 5	Total n	Average Response
Non-Durable Goods Manufacturing	1	3	5	5	1	15	3.1
Machinery and Metalworking	2	1	4	5	2	14	3.3
Transportation & Utilities	1	0	4	5	2	12	3.6
Wholesale Trade	3	5	9	1	2	20	2.7
Retail Trade	2	2	4	4	2	14	3.1
Finance, Insurance & Real Estate	5	3	13	3	4	28	2.9
Services	2	4	4	6	3	19	3.2
Total	16	18	43	29	16	122	3.1
Percent of Totals	13.1	14.8	35.2	23.8	13.1	100.0	

One open-end question was used to ascertain any other comments that the respondents wanted to make. For instance, one business leader stated:

> Our business is a sales/service business. Most products are relatively simple. Personnel need to be technically oriented, but their intra-personal skills are far more important.

Another business person stated: "We are a service business. It is difficult to find employees with a service attitude among the young people."

In reference to technical skills, one business person stated: "The work environment has become so complex that one must have some technical training."

The following is a partial list of the comments from business and industry personnel about the work environment and education:

> More and more management relies on the individual employee to make decision on the day to day functions and questions on the individual job. The ability to do jobs without specific constant instruction and direction is increasingly important particularly as technical jobs move from manufacturing and traditional "smokestack" industry to service and information concerns. Necessarily such operations become more mentally complex. With greater latitude in day to day functional decision-making, the ability of employees to communicate, reading and writing and oral skills , and the ability to work well with other people, is becoming a bottom-line consideration.
>
> I feel the education system should look to Japan as I understand their students get practical real life problems as well as "Book Learning!" The young people today whether high school or college have no idea what the business world is like.
>
> In retail hardware, high mechanical skills are necessary to compliment our service related business. To be able to comprehend and explain to customers, product knowledge is very important in this business. People (consumers) today are very lazy about reading instructions. Whether they can't read or whether they can't comprehend what they read, I can't say. People bring back more and more items every day because it wouldn't do what they thought it would do or should.
>
> In any age communication and reasoning abilities coupled with discipline, self-reliance and a healthy, "happy" attitude will see you through. Technical skills and job knowledge are an overlayment and can be acquired, but a viable, working brain is another matter. The way it is going, you should have to prove your competency before being permitted to watch TV, drive a car or even walk the streets.
>
> More work will be done by less people with more skill.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of the study was to determine the skills and knowledge needed by business and industry in the Indianapolis, Indiana area as identified through surveys, interviews and research. A comparison was made of the perceptions of business and industry personnel as classified into selected Standard Industrial Codes (SIC).

Data were gathered through confidential questionnaires. The data-gathering instrument consisted of questions and scaled items using bi-polar objectives (Appendix B). The scale used was one to five. The instrument was completed by 152 business and industry personnel classified into seven SIC groups, the nondurable goods manufacturing, machinery and metalworking, transportation and Utilities, Wholesale Trade, Retail Trade, Finance, Insurance and Real Estate, and Services.

Summary of Findings

Historically, education has been a highly important dimension of the American lifestyle and value system. Especially in recent years, formal schooling has preceded economic well-being for those entering the work force.

The evolving structure of the American economy, with the marked advances in technology, continue to raise skills levels of jobs. Unquestionably, formal schooling is the more important means for skills

development. Additionally, the levels of skills qualification which workers bring to the labor market can clearly enhance their productivity. U.S. Department of Labor projections indicated that the economy is expected to generate a 22 percent increase in the number of jobs between 1978 and 1990. However, the field of high-technology i s not the one in which more new jobs will be found nor will the use of high-technology require a substantial upgrading of the skills of the America labor force. Expansion of the lowest skills jobs in American economy will vastly outstrip growth of those in high-technology areas as indicated in Chapter II.

Because of the quantity and complexity of information reported by Standard Industrial Codes (SIC) in the various tables throughout Chapter Iv, the summary was limited to findings pertaining to selected items and to the group as a whole. Specifically, the business and industry leaders were asked to comment on how important technical skills and knowledge were in the hiring of future employees. Comments were also requested on how important personal skills were in the hiring of future employees.

The degree of important of job-related technical knowledge was indicated by an average response of 3.9 on a five point scale. A majority of the business and industry personnel (63.1 percent) indicated that job-related technical knowledge was important to very important and personnel of the same SIC groups indicated that job-related technical knowledge was more important than others. Transportation and utilities indicated the highest average response rate with 4.2, and the lowest response rate was 3.6 by the retail trades group.

Personnel from business and industry indicated that one of the most important items listed under the technical skills and knowledge heading

was good work habits. The average response rate for good work habits was 4.7 for all categories of respondents. In addition to indicating that good work habits were important, 77.5 percent of the respondents recorded that the item was very important.

The study also revealed other technical skills and knowledge that business and industry personnel indicated to be important. The other items in the top five of importance are overall quality of work 4.64, communication skills 4.37, organizational skills 4.21, and problem-solving skills 4.16.

The highest rated item in the survey was from the personal skill category. The business and industry leaders rated attitude toward the job as a 4.83 on the five point scale. The data indicated 2.9 percent of the business and industry leaders perceived attitude toward the job as very important.

The other personal skills items rated in the top five are attendance 4.77, ability to learn 4.64, punctuality 4.61, and ability to follow instructions 4.60.

Reported perception indicated that a high school education was very important, followed by one to two years of college.

Also, in describing the nature of work, business and industry personnel indicated that the skills required to perform most jobs are becoming more broad (65.7 percent). The study was also designed to identify if jobs are becoming more complex or more simple. The average response was 4.1 that jobs are becoming more broad for all categories of respondents on a five point scale. Almost 81 percent reported that jobs are becoming more complex.

Attitudes of business and industry personnel toward the effect of postsecondary education opportunities as a primary reason for selecting a location to do business were moderately favorable. The average response was 3.1 for all categories of respondents on a five point scale.

Conclusions

The following conclusions applicable to business and industry which are similar in characteristics of the sample organizations were drawn from the findings:

1. Good attitude toward the job can be expected to be one of the prime characteristics that are very important to employers.
2. Good attendance and good working habits are also very important skills and knowledge needed by potential employees of the future.
3. Good employees must have adequate communication skills, adequate organizational skills and adequate problem-solving skills.
4. Good personal skills in the areas of attendance on job, ability to learn, punctuality for the job, and the ability to follow instructions are required by employers.
5. All group surveys indicated that computer skills were slightly above average in degree of importance for hiring future employees.
6. All group surveys indicated that knowledge across trade lines in hiring future employees were slightly below average in importance.
7. The minimum level of education required for most technical positions in hiring future employees will be a high school education and one to two years of college.
8. The nature of the work place will require skills to perform most jobs to be more broad and more complex.

9. The nature of the work place will see the number of skilled jobs for future employees to be on the increase.
10. The decline of the number of young people available for work over the next decade will have a negligible effect on the business community.
11. The trend of early retirement and employees looking for second careers will have a negligible effect on the business community.
12. The importance of postsecondary education opportunities as a primary reason for selecting a location to do business was perceived to be of average importance.

Recommendations

1. Since business and industry leaders generally rated the technical skills and knowledge and personal skills needed for future employees at a high level, it is recommended that an in-depth assessment of attitudes toward the future types of employees needed by the business community be made. The assessment should begin with a more detailed analysis of data collected through the survey used in the study, making correlation studies within each sample to identify trends and factors which influence the responses. Further in-depth study should be guided by the results of the correlation study but could include a follow-up questionnaire to selected groups and/or interviews with individual members of the business community.
2. Because of the changing nature of business and industry and the projected employer needs for future types of employees, it is recommended that studies of this type be conducted regularly, at least every five years.

3. It is recommended that a study be conducted to determine if there are different entry-level requirements for employees according to the size of the organization.

APPENDICES

APPENDIX A

Letter to Business and Industry Leaders

May 12, 1986

Dear Community Leader:

Indiana Vocational Technical College is in the process of assessing the skills and knowledge needed by future employees.

The administrators and faculty at Indiana Vocational Technical College strive to offer educational programs that will meet the employment requirements of the community as well as the goals and ambitions of the students. We need to know whether the College is meeting the needs and expectations of local businesses, industries, and public agencies. This questionnaire is brief and your answers are very important to the study. Your responses will be treated confidentially

Please complete the questionnaire and mail it in the enclosed self-addressed, stamped envelope by May 21, 1986.

Thank you very much for your assistance.

Sincerely,

Meredith L. Carter

Meredith L. Carter
Vice President/Dean

/trc

APPENDIX B

Survey Instrument

Indiana Vocational Technical College
IMPORTANT INFORMATION NEEDED

Your perception of the skills and knowledge your employees of the future will need will be very helpful to the College in our evaluation of the effectiveness of our instructional programming. The information you provide will be treated confidentially.

Survey

Please mark each item on a five (5) point scale. One (1) being not important to five (5) being very important. If you feel the item is not applicable, please circle zero. Please circle one number for each item.

Technical Skills: How important do you rate the following skills and knowledge of the employees you would hire in the future:

		N/A	Not Important				Very Important
1.	Job-related technical knowledge	0	1	2	3	4	5
2.	Good work habits ("working smart")	0	1	2	3	4	5
3.	Organizational skills	0	1	2	3	4	5
4.	Communication skills	0	1	2	3	4	5
5.	Mathematics skills	0	1	2	3	4	5
6.	Computer skills	0	1	2	3	4	5
7.	Problem solving skills	0	1	2	3	4	5
8.	Overall quality of work	0	1	2	3	4	5
9.	Quantity of work accomplished	0	1	2	3	4	5
10.	Reading ability	0	1	2	3	4	5
11.	Evaluation and Analysis	0	1	2	3	4	5
12.	Critical thinking	0	1	2	3	4	5
13.	Creativity	0	1	2	3	4	5
14.	Decision making with incomplete information	0	1	2	3	4	5
15.	Knowledge across trade lines (i.e. electrical, welding, pneumatics)	0	1	2	3	4	5
16.	Other (Specify) _____	0	1	2	3	4	5
17.	Other (Specify) _____	0	1	2	3	4	5

Personal Skills: How would you rate the following characteristics for hiring future employees:

20.	Attendance	0	1	2	3	4	5
21.	Punctuality	0	1	2	3	4	5
22.	Attitude toward job	0	1	2	3	4	5
23.	Ability to follow instructions	0	1	2	3	4	5
24.	Ability to work without supervision	0	1	2	3	4	5
25.	Cooperation with other workers	0	1	2	3	4	5
26.	Cooperation with management	0	1	2	3	4	5
27.	Personal appearance, dress	0	1	2	3	4	5
28.	Self-discipline and self-reliance	0	1	2	3	4	5
29.	Tolerance for ambiguity (tolerance for not having all answers)	0	1	2	3	4	5
30.	Ability to learn	0	1	2	3	4	5
31.	Other (Specify) _____	0	1	2	3	4	5
32.	Other (Specify) _____	0	1	2	3	4	5

Nature of Work: How would you rate the following for hiring future employees:

33. What is the minimum level of education you will require for most technical positions?
___High School ___One-year College ___Two-year College (Associates Degree)
___Bachelors ___Masters ___Doctorate

34. Are the skills required to perform most jobs becoming more narrow or more broad in scope?
Narrow 1 2 3 4 5 Broad

35. Are most of your jobs becoming more complex or more simple?
Simple 1 2 3 4 5 Complex

36. Will the number of skilled jobs decrease or increase?
_____ Increase _____ Decrease _____ No Change

37. It is predicted that the number of young people available for work will decline drastically in the next decade. Would this trend affect your business?
_____ Yes _____ No

38. It is predicted that employees will retire early in their lifetime and look to second careers in mid-life. Would this trend have an important affect on your business? _____ Yes _____ No

39. How important do you feel postsecondary education opportunities are as a primary reason for selecting a location to do business?

N/A	Not Important				Very Important
0	1	2	3	4	5

40. Any other Comments?

Bibliography

BIBLIOGRAPHY

Books

Bessire, Howard D. A Handbook for the Eighties: Industrial Development. Schiller Park, Illinois: AEDC Educational Foundation, 1981.

Birch, David L. Job Creation In Cities. Cambridge, Massachusetts: Massachusetts Institute of Technology, 1980.

Birch, David L. Choosing a Place to Grow: Business Location Decision in the 1970's. Cambridge, Massachusetts: Massachusetts Institute of Technology, 1981.

Birch, David L., MacCracken, Susan. Corporate Evolution: A Micro-Based Analysis. Cambridge, Massachusetts: Massachusetts Institute of Technology, 1981.

Central Research Systems. A Strategic Plan for the Industrial Development of Indianapolis: Economic Analysis and Strategies. Indianapolis, Indiana: Central Research Systems, Inc., May 1982.

Eurich, Nell P. Corporate Classrooms: The Learning Business. Lawrenceville, New Jersey: Princeton University Press, 1985.

Hunt, H. Allan., and Hunt, Timothy L. Human Resrouce Implications of Robotics. Kalamzoo, Michigan: W.E. Upjohn Institute, 1983.

Indiana Employment Security Division. Trends. Indianapolis, Indiana: Indiana Employment Security Division, Research and Statistics, 1982.

Naisbitt, John. Megatrends: Ten New Directions Transforming Our Lives. New York: Warner Books, Inc., 1982.

The National Commission on Excellence In Education. A Nation at Risk. Washington, D.C.: 1983.

Articles In Journals

Cetron, Marvin I. "Jobs with a Future." Nuestro, (September 1983), 22-30.

Doyle, Denis P., Levine, Marsha. "Business and the Public Schools: Observations on the Policy Statement of the Committee for Economic Development." Phi Delta Kappan, (October, 1985), 113-118.

Fallows, James. "America's Changing Economic Landscape." The Atlantic Monthly, (March, 1985), 47-68.

Forbes, Roy H. "Thinking Skills: What are They? Can They be Taught? Why and How?" The Technology Teacher, (April, 1985), 5.

Giulianna, Vincent E. "The Mechanization of Office Work." Scientific American, (September, 1982), 148-164.

Mohrman, Kathryn. "Liberal Learning is a Sound Human Capital Investment." Educational Record, (Fall, 1983), 56-61.

National Association of State Boards of Education. "Thinking Strategically About the Future." Education Week, (November 14, 1984), 10-14.

Unpublished Materials

Bennett, Stuart Reed. "Pre-Employment Training Requirements for Fluid Power Skilled Workers and Technicians." Unpublished Ph.D. dissertation, Texas A & M University, 1982.

Clinton, Barbara Jeanne, "Development and Validation of an Instrument to Assess Problem Identification Skills of Institutional Supervisors." Unpublished Ed.D., University of Georgia, 1981.

Dimancescu, Dan. "A New Economic Future and the Innovation Process." Paper presented to the 1984 Governor's Conference on the Role of Higher Education in Indiana's New Economy, Indianapolis, Indiana, January 12, 1984.

Levin, Henry M. "Planning for Higher Education and Jobs in an Age of High Technology," Paper presented to the 1984 Governor's Conference on the Role of Higher Education in Indiana's New Economy, Indianapolis, Indiana, January 12, 1984.

ERIC Clearinghouse for
Junior Colleges OCT 16 1987